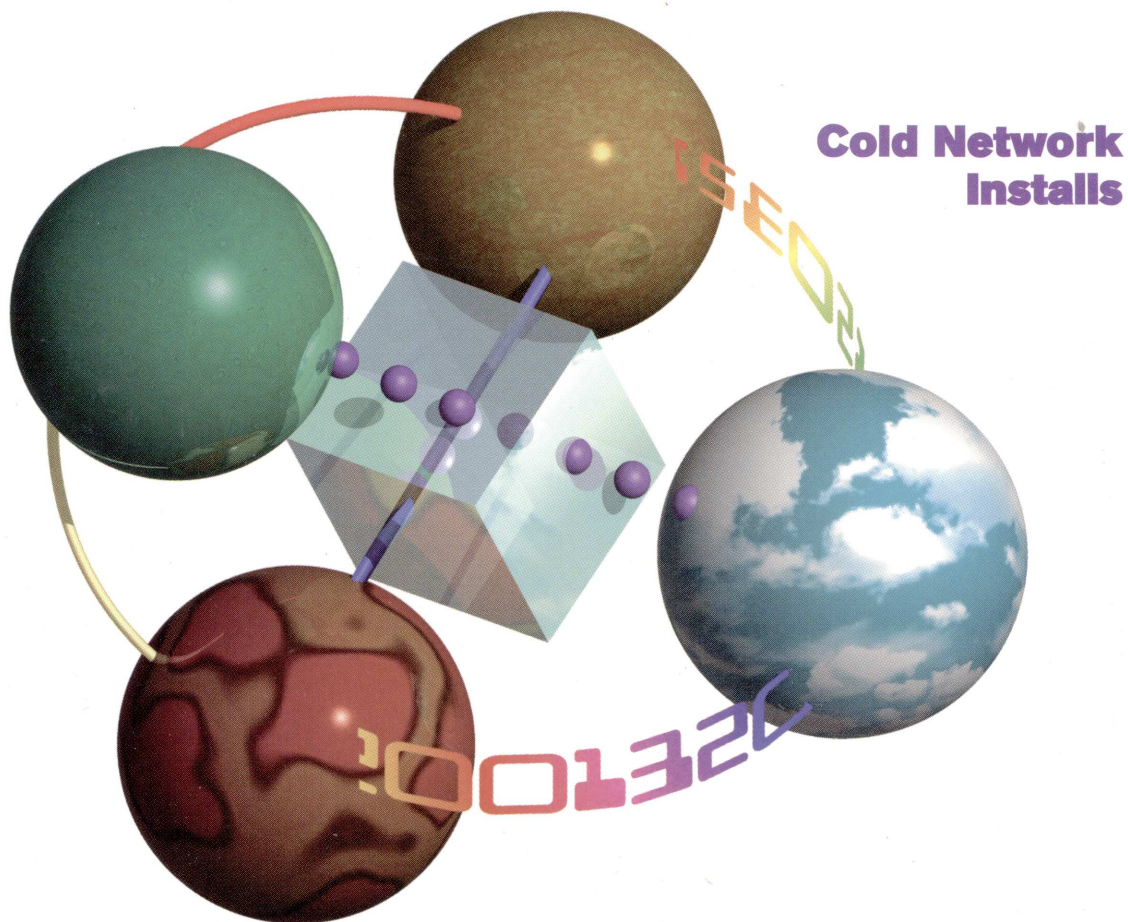


hp-ux/usr

Hands-On Solutions for HP-UX Users • September 1994



Desktop Management Growing Up • Understanding Some System Parameters
Career Resources for Computing Professionals • Reflection X Connectivity Suite

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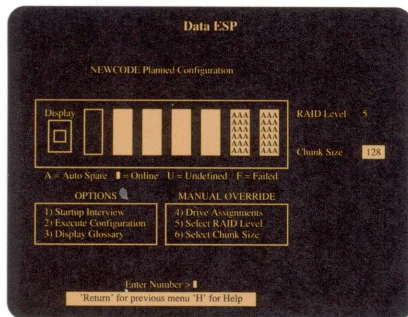
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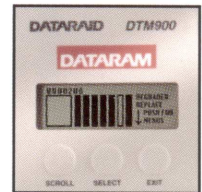
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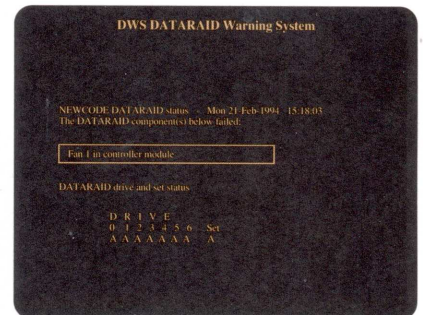
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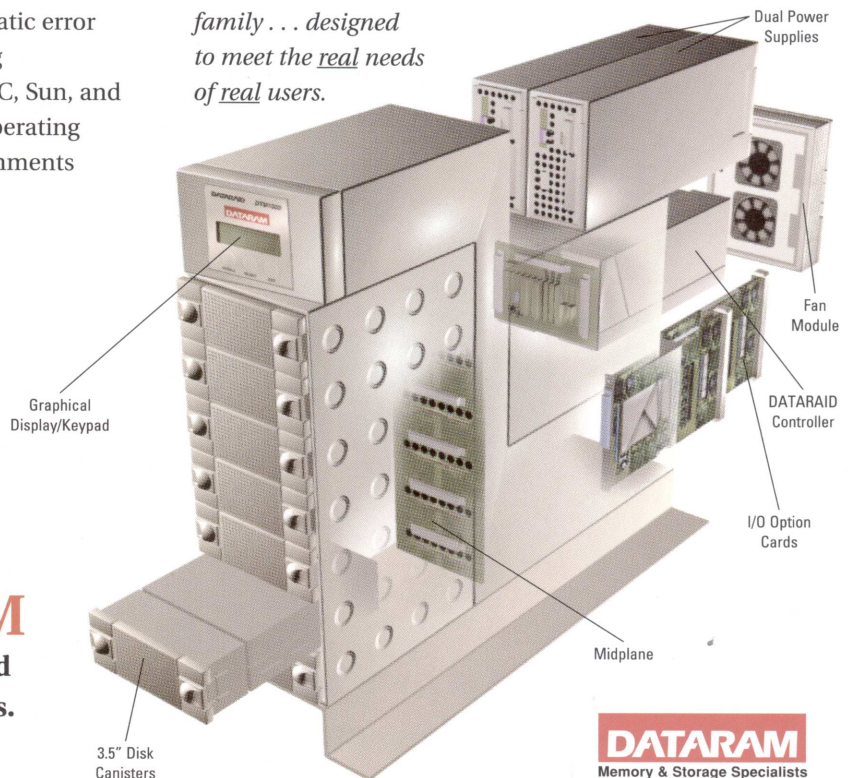


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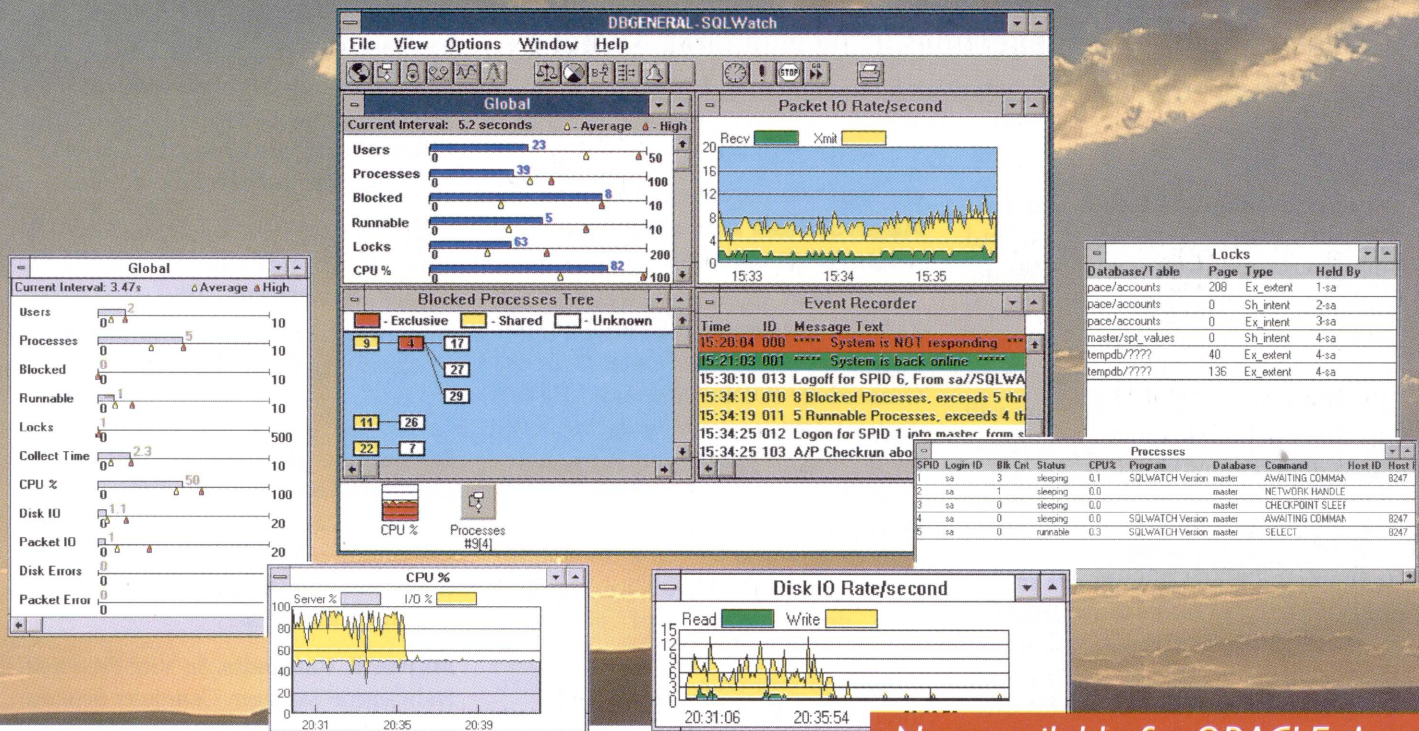


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Willem R. Roelandts, Sr. Vice President and General Manager, Computer Systems Organization, Hewlett-Packard Co., will deliver a key message from Hewlett-Packard on the company's Computer Systems Organization.

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Dr. George Schussel, Chairman, Digital Consulting, Inc., will present a technology tour of the latest in application development. You will learn what's hot and what's not in client-server computing, database replication, object environments, and more!

Dale Williams, Executive Director, National Information Infrastructure Testbed, will address the substance behind the hype of the "information superhighway." He will discuss such urgent questions as: What is the "data superhighway"? Who will pay for it? How can you get involved?

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Peter Duffey, Progress Software

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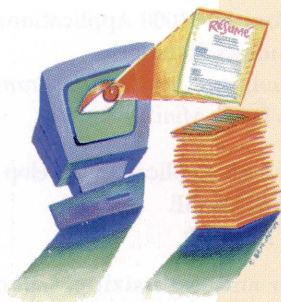
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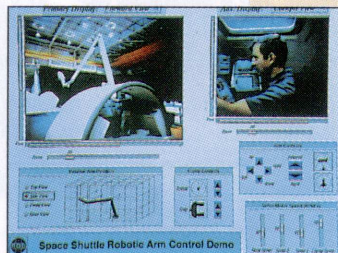
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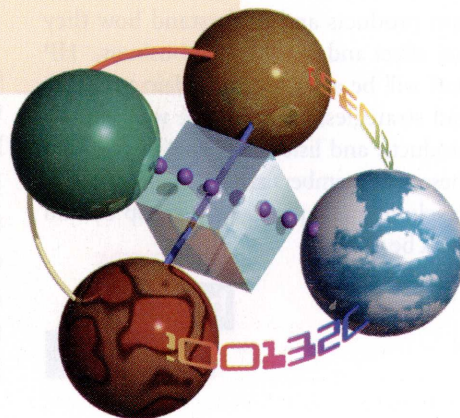
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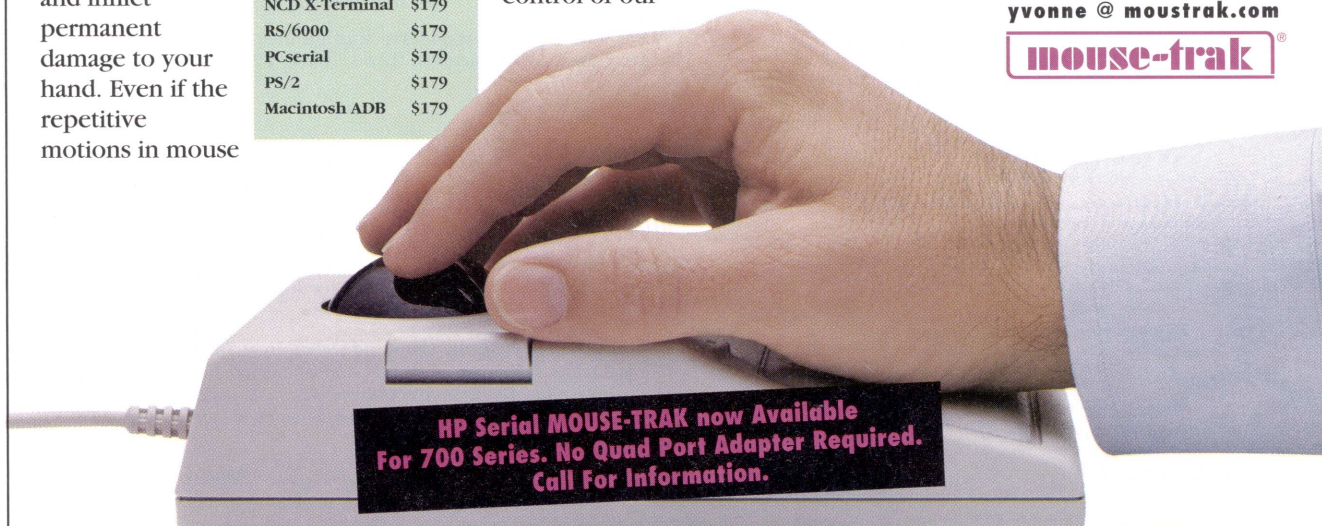
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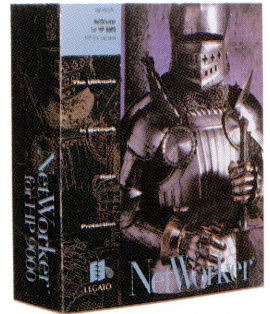
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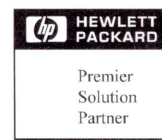
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Question & Answer

Q: Where is a list of HP model numbers and processor types?

A: For a list of HP 9000 models, PA chip version, and processor name, see the file `/usr/lib/sched.models` (as of 9.0 version of HP-UX). The format looks like this:

```
; VERSION A.00.04
600          1.0   PA7000
635          1.0   PA7000
645          1.0   PA7000
700          1.1   PA7000
705          1.1a  PA7000
715          1.1b  PA7100
710          1.1a  PA7000
712          1.1c  PA7100LC
720          1.1a  PA7000
722          1.1c  PA7100LC
725          1.1b  PA7100
```

and so on. The complete list is in the file.

Q: My magtape and DDS devices don't seem to act right. When I position the tape using the `mt` command, the tape doesn't always stay put and seems to move to a different location. What's happening?

A: AT&T versus Berkeley tape device handling has always been a mystery—especially, Why the two different methods? Suffice it to say that the default tape device files are AT&T style and from the man page for `mt(3)`:

When a file open for reading only is closed and the no-rewind bit is not set, the tape is rewound. If the no-rewind bit is set, the behavior depends on the style mode. For AT&T-style devices, the tape is positioned after the EOF following the data just read. For Berkeley-style devices, the tape is not repositioned in any way.

For any task involving tape movement, either by `mt(1)` or programmatic calls (`ioctl`) to position the tape, use a Berkeley device file. To create a Berkeley device file, typically only the no-rewind Berkeley file needs to be made, and for the Series 800, you can use the `/etc/mksf` command as in:

```
/etc/mksf -d tape2 -H 52.0.0 -r -u -n -b 1600 /dev/rmt/0mnb
```


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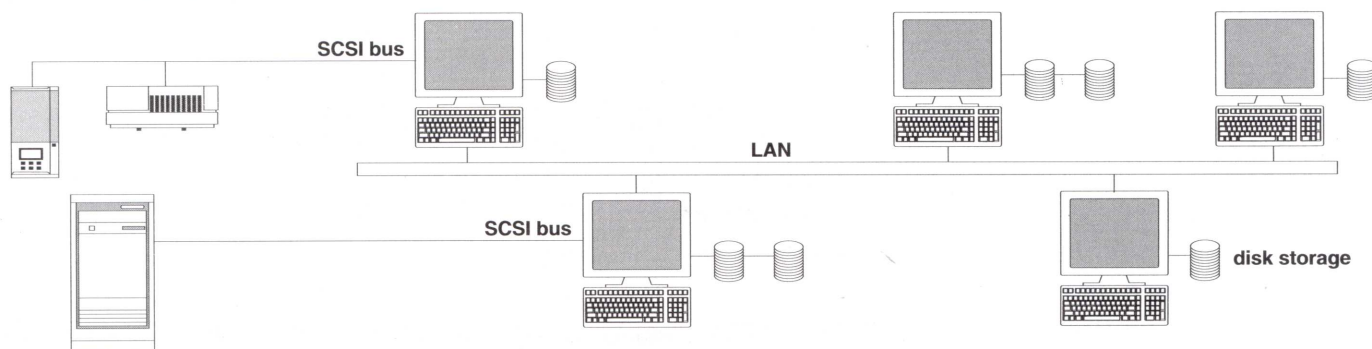
- 4mm tape
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- Optical disk

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where:

-d tape2 SCSI tape device
 -H 52.0.0 = hardware path to the device
 -r = raw character device
 -u = Berkeley style
 -n = no-rewind on close
 -b 1600 = medium density
 /dev/rmt/0mnb = the name of the device file to be created

For workstations (Series 300, 400, or 700), refer to the peripherals installation manual for the meaning of specific bits in the minor number to indicate the options.

Q: I need to interact with a shell program to enter text in response to a question and I'm using the following:

```
#!/bin/ksh
/bin/echo "printname\c"
read name
echo $name
```

However, if I enter just a few characters and then backspace two or three times, the cursor jumps to the lefthand margin and begins overwriting the prompt string. How can I fix this?

A: You probably have the EDITOR environment variable set to *emacs*. Change the script to:

```
#!/bin/ksh
EDITOR=vi
/bin/echo "printname\c"
read name
echo $name
```

The *emacs* option processes incoming characters differently and thus the requirement for setting the variable within the script. An alternative is to use the Bourne shell, which does not use the EDITOR variable and simply follows the standard terminal (*stty*) and terminfo settings.

Q: I need to improve security on my system, but I can't

locate information on password aging. How can I set up password aging and control the values?

A: Password aging is explained in the manual *How HP-UX Works: Concepts for the System Administrator*. See the section called "The /etc/passwd File."

Basically, password aging is set up by editing the */etc/passwd* file and adding an optional aging field after the encrypted password. The field is comprised of three parts:

, max min wks

where

, sets off the age field from the encrypted password.
 max = maximum weeks that a password will be valid.
 min = minimum weeks that the password must be in effect before it can be changed. (If min is greater than max, only the System Administrator can change the password.)
 wks = number of weeks since the password was changed.

Each value is represented by a single character, encrypted this way:

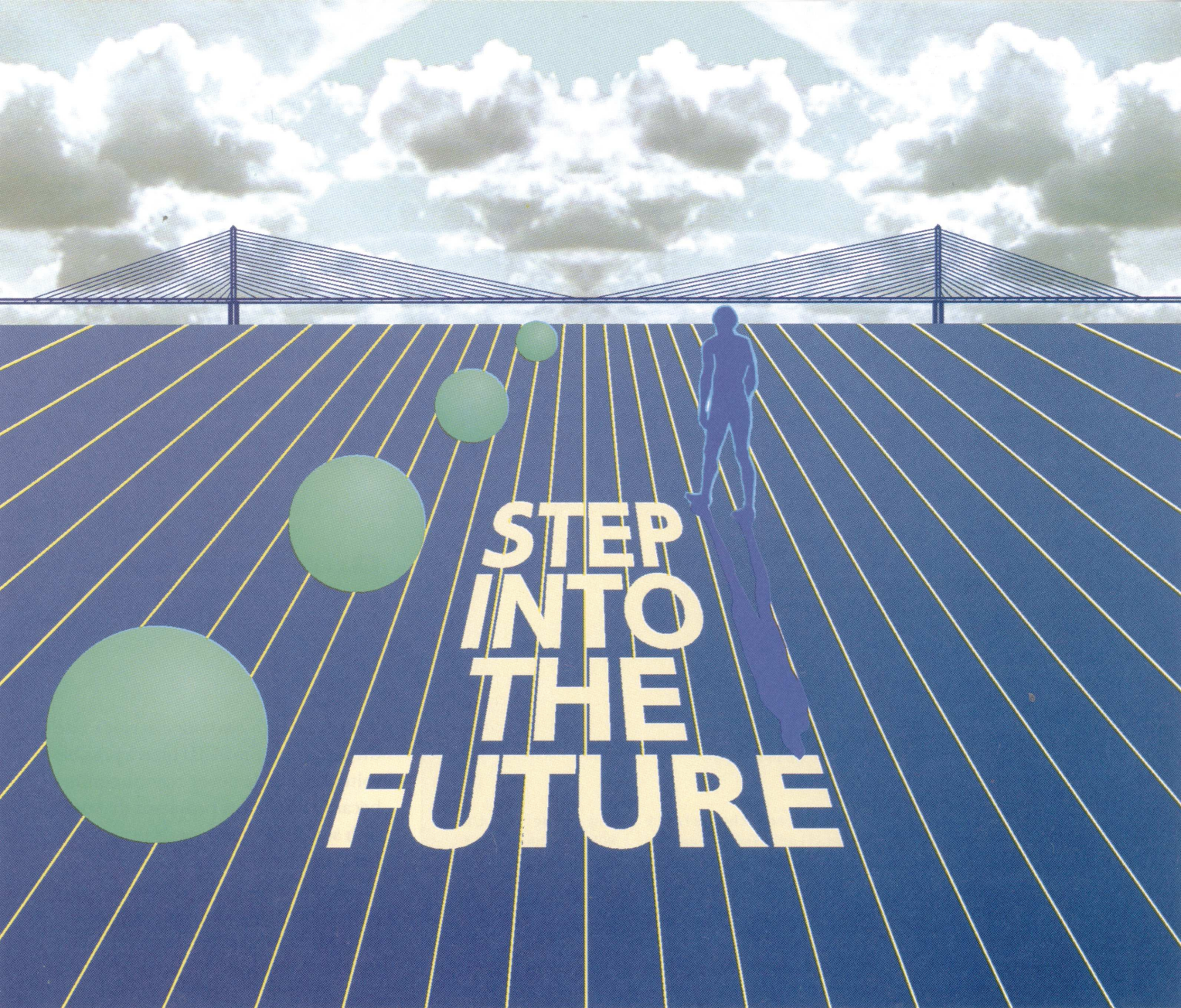
Character	Weeks
.	0
/	1
0-9	2-11
A-Z	12-37
a-z	38-63

Here's an example from */etc/passwd*:

```
bill:r4hRJ4GJ4CqE,8/:452:20:Bill Hassell:
/users/bill:/bin/ksh
```

User 'bill' must change his password at least every 10 weeks (8 means 10 weeks) but cannot change it more often than once a week ('/' means 1 week).

SAM does not currently have a method to set up password aging, but it can be accomplished with Task Customization. Add the script in *Listing 1* to post-customization for users in SAM and a standard aging value can be placed automatically.



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CIRCLE 104 ON READER SERVICE CARD

LISTING 1

```

#!/bin/sh
#
#
# This is a nifty way to debug...errors go to /tmp/sam.custom.err
# while standard-out (as in set -x for tracing) go to /tmp/sam.custom.log
#
exec > /tmp/sam.custom.log 2> /tmp/sam.custom.err
# These are all the params passed over by SAM
for param in $*
do
    case $param in
        -l) login_name=$2; shift 2;;
        -h) home_dir=$2; shift 2;;
        -v) uid=$2; shift 2;;
        -g) group=$2; shift 2;;
        -s) shell=$2; shift 2;;
        -p) password=$2; shift 2;;
        -R) real_name=$2; shift 2;;
        -L) office_loc=$2; shift 2;;
        -H) home_phone=$2; shift 2;;
        -O) office_phone=$2; shift 2;;
    esac
done
# Change the following line to reflect the default aging value for the
# system. See passwd(4) for detailed list of values. NOTICE the use of
# \ character to escape special meaning so that ed will work later.
#
# The value 2/ means that:
#     2 = 4 weeks until a password change is required
#     / = 1 week before another change can be requested by the user
#     no other values for the number of weeks since last change will
#     prompt the user immediately to change the password at first login.
age_value="2/"
search_string="$login_name:$password"
# Check to see if this is a trusted filesystem and set a variable for
# the appropriate passwd file
if [ -f "/.secure/etc/passwd" ]
then
    password_file="/.secure/etc/passwd"
else
    password_file="/etc/passwd"
fi
# Use ed() to modify the password entry
# Make sure there is no whitespace at the end of any of the ed()
# command lines
echo $search_string >> /tmp/samlog
cat - << EOF | ed -s $password_file
1,$ s:$search_string:$search_string, $age_value%
w
q
EOF
exit 0

```

By going into SAM under the User's menu and selecting Task Customization, you can add this script (with possibly other additions) to the add-user tasks. Be sure that the script is *700 permissions, owned by root*. A common place for these scripts is */usr/sam/custom*.

Q: I need to give my users limited access to commands that normally require root user access. How can I do this safely?

A: Although making a script to do the task using the SUID bit is a possible solution, this is never recommended because of security problems that exist with scripts. A better way is to write a C program to do the task. Here is an example of a program that has very limited functionality (stops and restarts the spooler) and can safely be given to users for execution:

```

/*
 *
 * Program must be compiled into
 * an a.out file.
 * 1) cc lpreset.c
 *
 * Then as root do:
 * 2) chown root a.out
 * 3) chmod 4555 a.out
 * 4) mv a.out lpreset
 */
main()
{
    if(setuid(0) < 0) {
        perror("setuid");
        exit(1);
    }
}

```


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```
system("/usr/lib/lpshut");
system("/usr/lib/lpsched");
}
```

Q: When I click on the terminal on the front panel of my HP Vue screen, the hpterm window that is started does not read the login shell scripts associated with my shell. How can I change this?

A: This is the default behavior for HP Vue and the action associated with this control. To change this behavior you must first decide if you wish to make this a global change for all users on this system, or a local change just for your user. The steps to do both are defined below.

You must also realize that HP Vue is highly customizable. There are many different ways to achieve the same result. You may choose to use a different procedure than the ones described below and still get the desired results.

To make this change only for your own user follow these steps:

1. First check to see if your `$HOME/.vue` directory contains a `vuewmrc` file. If it does, go to step 2. If it does not, you must copy the file as follows. Be sure to change the copy's properties to grant you write permission:

```
cp /usr/lib/X11/vue/Vuewm/sys.vuewmrc $HOME/.vue/
                                     vuewmrc
```

2. The action that is executed when you click on the terminal control of your HP Vue front panel is defined in the `vuewmrc` file as `TERMINAL`. `TERMINAL` will not execute your login scripts but `HPTERM_LOCAL` will. Change all occurrences of `TERMINAL` to `HPTERM_LOCAL` in this file:

```
Terminal    [P] @term.m.bm f.action TERMINAL
```

After the change:

```
Terminal    [P] @term.m.bm f.action HPTERM_LOCAL
```

3. The only remaining step is to set the resource that will cause `HPTERM_LOCAL` to execute the login shell scripts.

The resource is the following:

```
hpterm*loginShell: True
```

The simplest way would be to type this line exactly as it appears above into a file and then merge that file into your resource database using the following command:

```
/usr/bin/X11/xrdb -m yourfilename
```

Using the `RES_EDIT` action defined in your file manager is another way to set this resource. For a detailed listing of places that HP Vue looks for resources, please see the *HP Vue System Administration Manual* (Part No. B1171-90023), in Section 8.

4. Finally, close all hpterm windows except the console and then log out of HP Vue and log back in. This is necessary to force HP Vue to reread the `vuewmrc` file and to kill all existing hpterm windows and cached hpterm.

If you now click on the front panel control to start an hpterm window, it should read your login shell scripts. It is very IMPORTANT to note, however, that while the changes to your `vuewmrc` file are permanent, the setting of the `hpterm*loginShell` resource will survive a logout only if you return to your current session or if you save your current session as your home session and return to your home session.

Now, to make this a global change for all users on this system:

1. If the user has his own `$HOME/.vue/vuewmrc` file, it must be changed in the same way as step 1 of the first procedure described above. If the user does not have this file, then the same changes must be made to the `/usr/lib/X11/vue/Vuewm/sys.vuewmrc` file. This will then affect all users who don't have their own copy of this file.
2. Again the `hpterm*loginShell` resource must be set to true. To make this global for all users, one option is to create a file called *HPterm* in the directory `/usr/lib/X11/app-defaults`. This file would then contain the resource name as follows:

```
hpterm*loginShell: True
```

This file will be read each time an hpterm is started and thus it will read the resource and in turn your login shell script.

3. Close all hpterm windows except the console and log out of HP Vue and back in. This will force HP Vue to reread your

`vueumrc` file and restart `hpterm` windows and cached `hpterm`s.

These changes will force all `hpterm` windows, whether started from the front panel, the file manager, or the command line, to read the login shell scripts by default.

General HP-UX and 9000 questions are answered by Bill Hassell, a support engineer at the HP Atlanta Response Center. He can be reached by e-mail at blh@hpuaatl.hp.com.

700 Workstations

Q: After installing MPOWER 2.01 on my HP 9000/735 workstation, all the users who run under the C shell are having problems when they try to log in. When a user tries to log in, the login fails and returns the user to the login screen. I have isolated this behavior to users of `/bin/csh`; executing `/bin/csh` from an `hpterm` window gives the following error:

```
to_short ran out of space.
Memory fault -core dumped
```

Why is `csh` failing after installing MPOWER and is there a fix for this problem?

A: This is a known problem at MPOWER 2.0x and there is a simple fix. First, I will explain why the error happens. At Version 2.0x RTW(Ready To Wear) Framework was added to MPOWER as a foundation for MPOWER and to aid in future application integration into MPOWER. This added several environment variables for use by MPOWER. The variable `VPMUSERFILESEARCHPATH` was added by RTW for VUE to locate end user bitmap and pixmap image files. The `VPMUSERFILESEARCHPATH` variable is too large for the C shell to handle. The C shell has a 1024-byte limit on buffers, which this environment variable goes past, causing the error. The fix for the problem is simple; just unset the variable as follows:

1. In the `/usr/rtw/scripts` directory, create a file, `rtw_csh_fix`, with the following content:

```
unset VPMUSERSEARCHPATH
```

2. Now, set the ownership and permissions on the file as follows:

```
chown bin:bin rtw_csh_fix
chmod 777 rtw_csh_fix
```

3. Next, create a link to the file as follows:

```
cd /usr/rtw/config/Xsession.d
ln -s /usr/rtw/scripts/rtw_csh_fix 0012.rtw_csh_fix
```

After this workaround is in place, icons must be located under `/usr/vue/icons` to be found by the File Manager. The C shell limit will be increased in a future release.

Q: I am running BASIC/UX 6.3 on an HP 9000 Series 382 at HP-UX 9.0. I would like to know how to move a BASIC/UX 6.3 file out to an IBM-compatible DOS 3.5 floppy.

A: To move a BASIC/UX file out to an IBM compatible DOS floppy, just place a DOS formatted floppy in your floppy drive and execute the following command:

```
doscp basicfilename /dev/floppy_device:dosfilename
```

You must remember, however, that the file will need to be in ASCII format before any DOS commands, such as `type`, will return anything intelligible. Standard BASIC/UX PROG files and BDAT files are binary files that will be useless on a DOS machine.

Q: When I start a BASIC Plus program that is utilizing widgets, I would like to be able to place the mouse cursor at a specified position on the screen (i.e., over a specific widget). Is this possible or does BASIC Plus control the placement of the mouse pointer and not allow the user to change the placement?

A: The location of the BASIC PLUS pointer can be set through BASIC/WS's SET LOCATION command after creating the BASIC PLUS widget as the following example shows:

This is a modified copy of the pushbutton widget from the BASIC PLUS help screen (see line 191).


```

10  DIM L$(1:3)[50]
20  INTEGER D(1:4),Dw,Dh,Bh,Bw,Bx,By,N
30  DATA "Label ONE","Label TWO","Label THREE"
40  READ L$(*)
50  !
60  GESCAPE CRT,3;D(*)
70  Dw=D(3)-D(1)
80  Dh=(D(4)-D(2))
90  Bw=128
100 Bh=Bw/2
110 Bx=(Dw-Bw)/2
120 By=(Dh-Bh)/2
130 !
140 Btn TO WIDGET "PUSHBUTTON";SET ("SYSTEM MENU":"Quit")
150 Btn;SET ("X":Bx,"Y":By,"WIDTH":Bw,"HEIGHT":Bh)
160 Btn;SET ("LABELS":L$(*),"STATES":3)
170 !
180 Btn,"ACTIVATED" GOSUB Handler
190 Btn,"SYSTEM MENU" GOTO Finis
191 SET LOCATOR 70,48 ! positions the pointer over the widget
200 LOOP
210 END LOOP
220 STOP
230 !
240 Handler:  !
250 Btn;RETURN ("STATE":N)
260 DISP "State = "&VAL$(N)
270 RETURN
280 !
290 Finis:  !
300 Btn TO *
310 END

```

Q: I am running BASIC/UX 6.3 on an HP 9000 Series 382. I would like to know how to change the default softkeys. Is there a file I can edit that will allow me to change the default softkeys that come up when I run BASIC/UX?

A: The default softkeys that you see when you run BASIC/UX are hard-coded into the application. To have a different set of softkeys come up when you run BASIC/UX, you will need to do the following:

1. Edit the default softkey after running BASIC/UX using the EDIT KEY command.

2. Save the new key definitions to a key file with the STORE KEY command.
3. Create an AUTOST file with a LOAD KEY "<key file"> command referencing the key file you created above.
4. Edit the \$HOME .rmbrc or your global rmbrc file for use of an autostart file.

This will cause BASIC/UX to load your softkey definitions automatically at the end of the bootup process. To return to the default softkeys, just execute a LOAD KEY command without a file name and the default softkey definitions will be loaded.

Q: How do you print in landscape mode with HP's SharedPrint? I am using an HP LaserJet IIIsi, which I have set up as a SharedPrint printer on my HP 9000/715. However, since setting the printer up, I have not been able to get it to recognize landscape or duplex modes when printing. I am issuing the following *lp* command line:

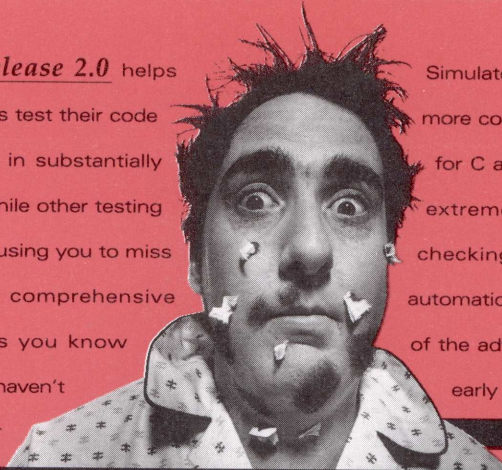
```
lp -dljIIIsi -olandscape myfile
```

A: SharedPrint is a Hewlett-Packard product that is integrated into the HP-UX *lp* spooler. This product allows the user to print many different types of files to the printer (e.g., tiff, jiff, bitmaps, text). This added functionality brings with it new options for spooling/printing files. These options are typically followed by a modifying string that replaces the normal *lp* options. This presents a problem when using the *lp* command with the *-o* option because the *lp* command processes the command line

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CIRCLE 161 ON READER SERVICE CARD

question & answer

from the `-o` to the first blank space and assumes that is the end of the option. In the case of SharedPrint, this prevents the correct option from being passed to the SharedPrint model script in its complete form. To use the print options for SharedPrint, you will need to quote the commands in, as the following example shows:

```
lp -dljIIIsi -o"-orientation landscape" myfile
```

The option in the above example, `"-orientation landscape"`, is the SharedPrint option for landscape mode. The SharedPrint printing options can be found in Appendix A of the *SharedPrint/UX User's and Administrator's Guide*.

Q: I administer an HP 9000/755 running HP-UX 9.03 and HP FAX 9000. I have several users who use the FAX 9000 product both to send and to receive faxes daily. However, recently one of the users has become unable to run the FAX 9000 application. After logging into the system, this user clicks on the

VUE icon I have set to run the fax product and nothing happens. The green VUE busy icon on the lower right of the VUE dashboard flashes to indicate that something is happening, but the FAX 9000 product never comes up. I have verified that other users can log in and run FAX 9000 without problem, so what could prevent this user from running FAX?

A: It sounds as if the FAX 9000 client process was killed or died an unnatural death while the user having a problem was logged into the system running FAX. When the HP FAX 9000 product exits unnaturally, it fails to clean up a file that prevents a user from starting more than one FAX 9000 session at a time; this file will cause the behavior you are seeing if it is not cleared. To correct this condition, `cd` to the users `$HOME/.fax` directory and remove the "fax.running" file. Now have your user log in; he should be able to run FAX 9000 without a problem. ■

Rudy Stanley of the HP Response Center in Atlanta, Georgia answers workstation questions.

Cold Network Installs

WITH THE ABILITY OF HP-UX 9.0 to perform "Cold Network Installs," it is now possible to install HP-UX onto a workstation with one or more empty, unformatted disk drives. The Cold Network Install process is similar to, but distinct from, the DAT tape or CD-ROM install process. The install kernel is "booted" from the network, making it unnecessary to have a tape or CD-ROM drive connected to the workstation being installed. The update process is also completed over the network.

This article will focus on performing Network Installs and creating a "Network Distribution" server necessary to complete the installs. This same NetDist server can also be used to do full or partial updates of existing systems over the network.

The discussion in this article assumes that the reader has a basic understanding of network terminology, the local network topology, and system administration tasks. For example, if you can look up IP addresses, Link Level Addresses (LLAs), know what (if any) subnet mask is used at your site, and are familiar with using *update(1m)*, you should have no problems configuring and performing network installations.

While any workstation connected to a LAN can be configured as a server for network installs, larger sites will benefit most from this process. System administrators who routinely install new stand-alone workstations and cluster servers, perform full or partial OS updates, install common OS patches, or distribute application software to many machines will appreciate the ability to perform these tasks over the network. Once a system administrator becomes familiar with creating and using a NetDist server, it is difficult to imagine managing a large site without one.

Terminology

Cold Network Install: Installing HP-UX 9.0 or greater onto empty S300, S400, or S700 workstation disks over a local area network.

Install Client: The S300, S400, or S700 workstation onto which you will install the HP-UX operating system.

Install Server: Another machine on your local subnetwork that is up, running HP-UX 9.0 or later (9.03 for S712 clients), and has the required filesets installed. This machine will pass the "install kernel" to the Install Client.

LLA: The Link Level Address or hardware address of a computer's network interface card. Also known as the Medium Access Control (MAC) address, Station address, and hostid.

NetDist Server: The machine from which you will update HP-UX over the network. This machine can reside anywhere on the network, and must have previously been configured as a Network Distribution server (see the sidebar "Creating a NetDist Server"). This machine can be an S300, S400, S700, or S800 system; it may be a stand-alone machine or a cluster server, but a cluster client cannot act as a NetDist Server. It is possible, depending on your network layout, for the NetDist Server and the Install Server (and even the network gateway) to be the same machine.

Scenario for This Article

Given the number of possible network layouts, the examples in this article are based on the following scenario. If some of this sounds confusing at first, don't worry! It will all make sense soon.

You have just received a new Series 735 "Snakes" workstation with 64 MB of RAM and two 400-MB "Wolverine" disks. You decide that you want to configure the disk at SCSI address 6 as the "root" disk with 64 MB of swap space. On the disk at SCSI address 5, you decide to put all of the "/usr" system files along with an additional 36 MB of swap space for a total of 100 MB.

You plan to install this machine on the "Aqua" subnet; you have determined that its IP address will be 15.13.194.21 and its hostname will be *foobar.cup.hp.com* (see Figure 1).

by Chris Cobb



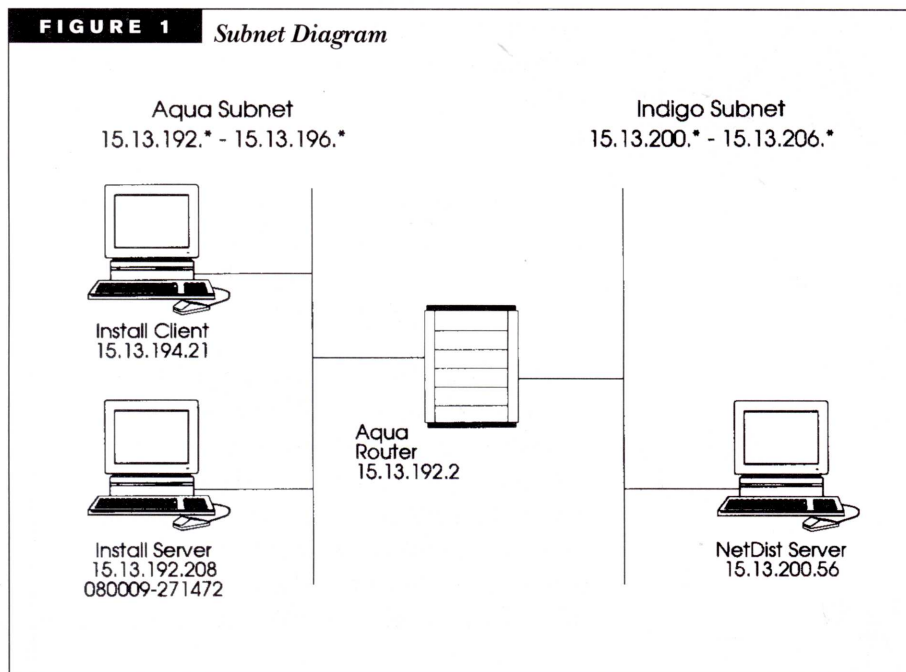
The machine that will act as your Install Server has an IP address of 15.13.192.208 and its LLA is 080009-271472; the subnet mask for your network is 255.255.248.0.

There is a Cisco Router between your subnet and the subnet where the NetDist server resides. The Router's Aqua IP address is 15.13.192.2.

The NetDist server resides on the "Indigo" subnet. Its IP address is 15.13.200.56, and the "netdist daemon" for HP-UX 9.01 is currently running on port number 9010.

The majority of this article is based on the scenario; however, there are some important differences when installing S300, S400, and S712 workstations. Notes on these differences will be included where they are relevant.

Illustration by Nea Hanscomb

FIGURE 1 Subnet Diagram

Configuring an Install Server

In order to install an operating system onto an empty disk, it is necessary to have a machine act as an "Install Server." This machine must be on the same local subnet as the machine onto which you plan to install HP-UX (the Install Client), and must be running HP-UX 9.0 or greater (9.03 for S712 clients). It may be, but does not need to be, the same machine as the NetDist Server.

If you have not already identified or created a NetDist Server (see the sidebar), you may want to complete this step first. You will need the NetDist server to complete the installation, and it can be of help in creating your Install Server.

Verify Install Server Filesets Are Installed

The Install Server must have two or three special filesets installed. The particular filesets depend on the type of clients you plan to install.

For S700 (except S712) clients, you will need RBOOTD and NET-INSTL-700; for S300 and S400 clients, you need the RBOOTD and NET-INSTL-300 filesets on your Install Server. Since the S712 does not use "bootp" protocol, to install these clients you will need the ARPA-RUN and NET-INSTL-700 filesets (and HP-UX 9.03) on your Install Server. These filesets allow the Install Server to pass a "network install kernel" to the

Install Client, enabling it to build a temporary RAM-based file system and configure its own disks based on input you provide via a series of dialogue screens.

If these filesets are not already on the machine you pick as the Install Server, run *update* and use your NetDist Server as the "source" for your install; the filesets are located under the OS-ADMIN, OS-FEATURES, and NETWORKING partitions. (You can do this even if the Install Server is the same machine as the NetDist Server; just update the machine from "itself." I would not recommend this trick, however, for updating critical system files.)

Starting /etc/rbootd

Once the necessary filesets are on the Install Server, make sure that the *rbootd(1m)* daemon is running. (This step is not necessary for S712 clients.) This is

the daemon that will respond to the "bootp request" from the Install Client when you start the install. If you did not just install the filesets mentioned above, or if your Install Client is also a Cluster Server, *rbootd* may already be running. You can check this by typing:

```
ps -ef | grep rbootd
```

If the daemon is not running, you need to start it by typing:

```
/etc/rtprio 64 /etc/rbootd /dev/lan0
```

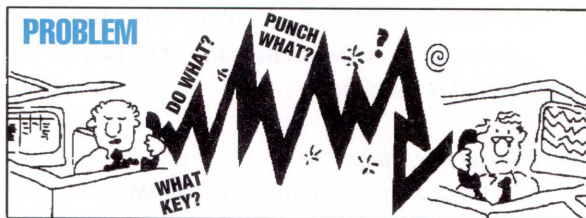
If the *rbootd* daemon does not stay up, you can enable logging by typing

```
/etc/rtprio 64 /etc/rbootd /dev/lan0 -l 3
```

Then look in */usr/adm/rbootd.log* for information that will help correct the problem. By default *rbootd* uses the device file */dev/ieee*, which may or may not exist on your system. Specifying *"/dev/lan0"* should solve this problem; however, if your LAN is configured on a different device, use that one instead. Alternatively, create a */dev/ieee* device file that looks like your primary LAN device file. For example on a Series 700 workstation type:

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```
/etc/mknod /dev/ieee c 21 0x201000
```

Then you should be able to start the daemon by typing:

```
/etc/rtprio 64 /etc/rbootd
```

If you need further information on troubleshooting *rbootd*, see the manuals *Installing and Updating HP-UX 9.0* and *Solving HP-UX Problems*.

Ensure Install Client is NOT a Diskless Client

Before continuing with the Network Install, verify that the Install Client is not a "Diskless Client" of the Install Server. If the Install Client is configured as a Diskless Client of the Install Server, it needs to be removed from the `/etc/clusterconf` file (e.g., by using SAM to remove the machine as a cnode).

After this, attempting to boot the Install Client from the Install Server will result in *rbootd* passing the install kernel defined in the `/etc/boottab` file instead of booting it as a Cluster Client.

Configuring /etc/boottab for S3/400 Install Clients

If you are installing S300 or S400 workstations over the network, you will need to make a change to the `/etc/boottab` file on the Install Server. By default, this file is installed with the last two lines starting like this:

```
# install:HPS300:: ...
install:HPS700:: ...
```

Remove the leading comment and space ("`#` ") from the second to last line just prior to booting the Install Client. After the client has successfully booted the install kernel, remember to re-comment this line on the Install Server. Leaving the comment on this line when you are not performing an install can prevent S300 and S400 users from becoming confused at a later date. Otherwise, for example, if their cluster server fails to respond, they may see the install kernel's dialogue screens instead and attempt to install HP-UX.

Configuring instl_bootd for S712 Install Clients

The S712 uses the *instl_bootd(1M)* and *tftpd(1M)* services instead of *rbootd*. These services are started via the *inetd(1M)* daemon and do not need to be run "manually." You will need to reserve an IP address that will be used exclusively for booting Install Clients; add this address to the `/usr/adm/instl_boottab` file. It is possible to reserve "boot IP" addresses for particular

Creating a NetDist Server

Building a NetDist Server is simply a process of running the *uptdist(1m)* command to copy files from a tape or CD-ROM in "update format" to disk files, and then starting a *netdistd(1m)* daemon to make the files available across your network. You need only have one NetDist Server running on your network, but you can set up more than one if desired. Hewlett-Packard, for example, has a NetDist server in Cupertino, California and in Fort Collins, Colorado to provide the latest releases of HP-UX available for each architecture. These machines are accessible to HP sites worldwide; if one machine is unavailable for any reason, it is easy to access the other when performing installs and updates.

You will need from 100 to 200 Mb of disk space, depending on the architecture and filesets you choose to make available.

Using /etc/updist

Load a tape or mount a CD-ROM containing the version of HP-UX that you wish to make available, make a new directory to hold the files (e.g., `/netdist/9.01`), and run the *updist* command:

```
/etc/updist -d /netdist/9.01
-s /dev/rmt/0m
-S 700
\*
```

In this example, there is a DAT tape loaded in a tape drive at SCSI address 0. The `-d` is the destination directory, the `-s` is the source, the `-S700` indicates we want to load files for the Series 700 architecture, and the asterisk indicates we want to load all filesets from the update tape. Note that the asterisk is preceded by a backslash; since the asterisk is a "meta-character" it is necessary to "escape" it from being expanded by the shell before it is passed to the *updist* command. It is also possible to use an existing NetDist Server as your source when running *updist* if you wish to create a duplicate of the server.

Continued



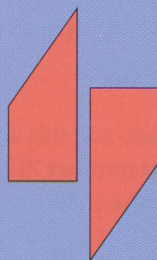
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CIRCLE 144 ON READER SERVICE CARD

Install Clients; refer to the comments in the `instl_boottab` file for further details. This requires HP-UX 9.03.

Also, you will not need to collect the LLA of the Install Server mentioned in the next section.

Do a Little Homework

Now we're almost ready to do the install; however, first there are a few numbers we need to collect. To continue our example, let's assume that we have contacted our site networking department and were given the Internet Protocol (IP) addresses listed near the beginning of this article. In addition, we have run *landiag(1M)* on our Install Server to collect its Link Level Address (LLA) and, since we just finished setting up our NetDist Server, we know that the *netdistd(1M)* daemon is running on port 9010.

At this point we have the following information:

LLA of the Install Server:	080009-271472
IP address of Install Client:	15.13.194.21
IP address of NetDist Server:	15.13.200.56
Port on the NetDist Server:	9010
IP address of the Gateway:	15.13.192.2
Subnet mask for net 15:	255.255.248.0
IP address of Install Server	15.13.192.208
Hostname of Install Client	foobar.cup.hp.com

Although we won't need the Install Server's IP address to complete the install, it will come in handy later to run *ftp(1)* on the Install Client and add a file or two necessary to complete the install. Also, we won't need the Install Client's hostname now, but we will need it to complete the installation.

Using `/etc/instl_adm` to Configure the Install Kernel

It is possible to "poke" default values into the install kernel on the Install Server using the *instl_adm(1M)* command. This is handy when the server will be used repeatedly to install new workstations. In our example we would type:

```
/etc/instl_adm -s 700
               -f /tmp/instl_msg
               -s 15.13.200.56
               -p 9010
               -m 255.255.248.0
```

These values become defaults; however, they may be

Creating a NetDist Server , continued

While you do not have to place all filesets from the tape on your NetDist Server, be sure to include the NET-INSTL-AUX fileset. This is required on the server but will not be installed on the Install Client machines. It is also possible to combine S700 and 300/400 filesets in the same directory tree. If you decide to do this, you will be prompted to select the architecture you wish to install when you run update on the client machine.

In the above example all the files will be loaded under the `/netdist/9.01` directory. Also, as the files are loaded, *updist* will create a file in this directory called **MAIN.pkg**. This file contains the information necessary to make the update partitions available on the network.

Create a TOOL Archive

If you plan to use your NetDist server to update systems from 8.0x to 9.0x, you will need to make the 9.0x version of *update* (and related tools) available to your 8.0x machines before performing the update. For example:

```
cd /netdist/9.01/700/TOOL/product
tar -cvf /tmp/TOOL.700 etc system
```

You will then need to copy the *tar(1)* file `/tmp/TOOL.700` to each 8.07 machine (in this example) and "untar" it prior to performing the update. For more information, refer to the *updist(1m)* "man" page and see Appendix B "Creating and Managing a NetDist Server" in the *Installing and Updating HP-UX 9.0* manual.

Check `/etc/services`

Verify that there is an entry in `/etc/services` for the "netdist" service:

```
netdist 2106/tcp # network file distribution
service
```

If this entry does not exist, add this line to the file. By default, *netdist* runs on port number 2106. If you wish to use another number for the default port, enter that

Continued on Page 28

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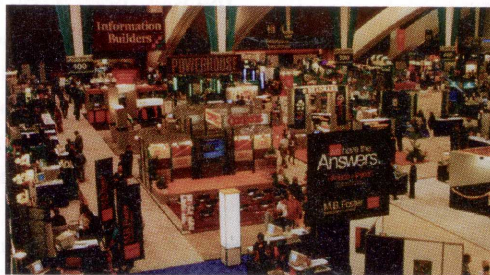
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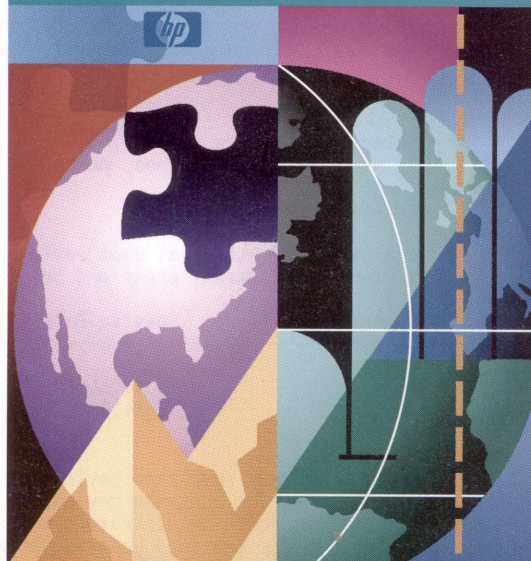
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FIGURE 2 *Selecting a System to Boot*

Selecting a system to boot.
To stop selection process, press and hold the ESCAPE key.

Selection process stopped.

Searching for Potential Boot Devices.
To terminate search, press and hold the ESCAPE key.

Device Selection	Device Path	Device Type	
P0	scsi.6.0	HP	C2235
P1	scsi.5.0	HP	C2235

b) Boot from specified device
s) Search for bootable devices
a) Enter Boot Administration mode
x) Exit and continue boot sequence
?) Help

Select from menu: b lan.080009-271472.3.6

“Searching for Potential Boot Devices.” Do not interrupt this second search; after a few seconds you will see a list of all the peripherals connected to your machine (see *Figure 2*).

Verify that everything you have attached shows up in the list. If something is missing, it's nice to know now rather than later. Check SCSI addresses, power cords, etc., and re-start the machine until everything you expect is shown. Also, if you see the Link Level Address of the Install Server in this list, the Install Client is currently configured as a Diskless Client and will need to be removed from the server's `/etc/clusterconf` file, as noted earlier.

At this point you will see the menu shown in *Figure 2*; you now boot the workstation via the LAN using the LLA of your Install Server. In this example we will type

b lan.080009-271472.3.6

changed during any install on the “Network Configuration Screen” as explained below.

The `-f` option is used to include any special instructions to assist the person doing network installs. The file `/tmp/instl_msg` is simply ASCII text that will be displayed on the screen during the install. This file does not need to exist after running `instl_adm` as the text is placed in the install kernel. Note that each time `instl_adm` is run, any parameter not included will be reset to its default value.

Booting the Install Client

Okay, here we go! There are some differences between booting S700 workstations, S300/S400 workstations, and S715 “Gecko” workstations. Let's continue with our example first; the differences are explained afterwards.

Installing HP-UX on a Series 700

Make sure all of the Install Client's peripherals are properly connected and running and that the LAN cable is connected. Power up the SPU and, after several seconds, you will see the message **“Selecting a system to boot. To stop selection process, press and hold the ESCAPE key.”** If you press the ESCAPE key as soon as this message appears, the boot sequence will be promptly interrupted; otherwise, you may have to hold the key down for a few seconds. You will then see the message

Almost immediately you should see the message “Attempting to load IPL” and a few other boot-related messages. You should soon see the first dialogue screen from the install kernel. If not (and you typed the boot string correctly, including the “dot,” the dash, and the correct LLA of your Install Server), there are a few things to look for.

Troubleshooting

Most Series 700 workstations have both a ThinLAN (BNC style) connector and an Attachment Unit Interface (AUI) for LAN connections. Only one of these ports may be active at a time and, depending on how your workstation is configured, you may need to switch the active port. If you are using ThinLAN coaxial cable that has a “tee” connector, activate the BNC port; if you use telephone-style Unshielded Twisted Pair (UTP) cable and a Medium Attachment Unit (MAU), activate the AUI port.

To check which port is active, pull the system board that has the BNC and AUI connectors from the back of the workstation and locate a 20-pin jumper and three rows of pins on the circuit board directly behind the two connectors (see *Figure 3*). To activate the BNC, the jumper should be on the two rows of pins farthest from the back of the box as shown in the diagram. To activate the AUI, place the jumper on the pins nearest the back of the box.

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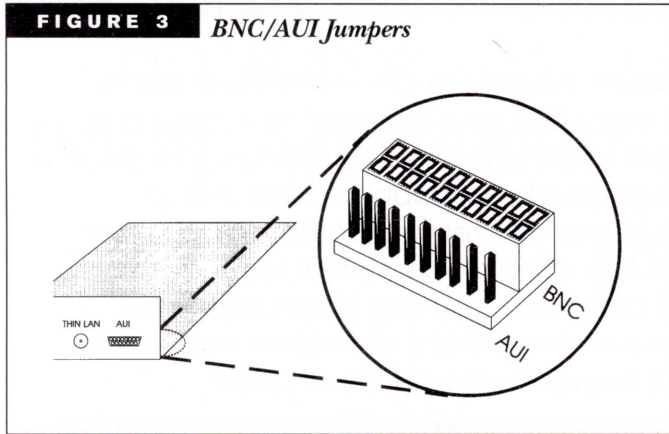
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FIGURE 3 BNC/AUI Jumpers

For workstations with a system board that does not pull out (e.g., S710, or an S400 workstation upgraded to an S700), you will need to open the top of the machine. The jumper will be in the same relative position in the back of the box. Depending on the model you have, the circuit board may or may not be labeled as shown in the diagram; however, the positioning of the jumper will be the same. Also, the size of the jumper may vary from model to model.

If the LAN jumper is in the correct position and your Install Client still does not boot, check the LAN hardware. You may have a bad or inactive LAN cable connected to the back of the Install Client.

Installing HP-UX on a Series 300/400

As soon as a S300 or S400 is powered up, it will begin identifying the video card, keyboard, memory, LAN card, and other interface cards. After the keyboard is recognized, the machine will beep and you will see "Keyboard" on the console. To interrupt the boot sequence press the spacebar and, after the memory check is complete and the LAN card is initialized, the machine will enter system search mode. Have a little patience and within a few minutes the Install Server will respond. You will see a list of possible boot devices; pick the one that corresponds to the LAN and the boot will proceed from here as on the S700. You will soon see the install kernel dialogue screens. At this point you can re-comment the HP S300 entry in the `/etc/boottab` file.

Installing HP-UX on a Series 712

Boot the Gecko using the "`b lan install`" command. You do not need to know the Install Server's LLA to boot a S712

Creating a NetDist Server, continued

number instead. You can also enter another port number on the command line as shown below.

Starting the *netdistd* Daemon

Now all that remains is to start up a *netdistd* server daemon. Simply type

```
/etc/netdistd -C 2
               -f /netdist/9.01/MAIN.pkg
               -L /netdist/9.01/netdist.log
               -P 9010
```

This tells *netdistd* to start a server on port 9010 using the package definition file created earlier when we ran *updist*. Output from the daemon will be logged in file `/netdist/9.01/netdist.log`. The `-C` parameter tells *netdistd* not to allow more than two concurrent connections on this port. When picking a port number, be sure to check in the file `/etc/services` to ensure that you do not select a number already in use on your system.

It is possible to exclude partitions from access by adding a comment character ("`#`") before the "source" lines in the `MAIN.pkg` file. If you do this after starting *netdistd*, you will need to signal the daemon to re-read the package definition by typing

```
kill -1 pid
```

where PID is the process ID number of the *netdistd* server daemon.

Creating Servers from Other Sources

It is possible to create a network update package from any product tape, CD-ROM, or *tar(1)* file in "update format." (It is also possible to create your own "update image" using *fpkg(1m)*, but this exercise is left to the reader.)

Creating a NetDist Server, continued

Continued

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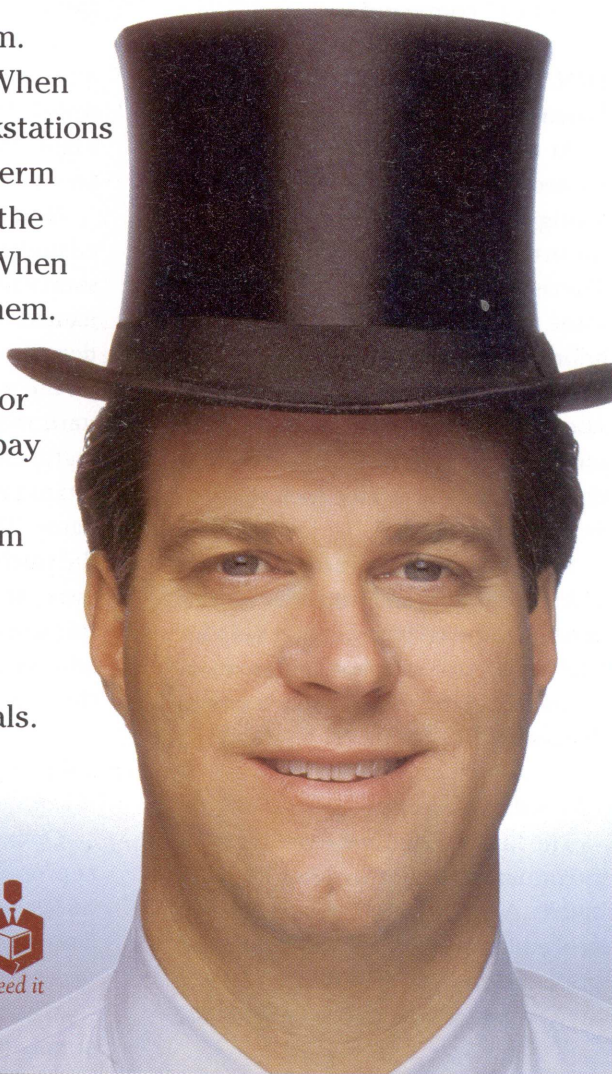
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Install Client. At the present time each subnetwork still requires a local Install Server for the S712 install. You will soon see the install kernel dialogue screens. To search for available Install Servers use the “`search lan install`” command.

HP-UX Installation Utility Dialogue Screens

At this point the Install Client has booted the install kernel and is ready to configure the local disks in preparation for installing HP-UX onto the system. There is a series of up to 18 screens; some ask for input and some are just informational. Even though this sounds like a lot, the action proceeds quickly! After doing an install once or twice, completing these screens should take less than a minute or two for each workstation you install.

Since these screens are easy to use and menu-driven, and have clear instructions (some even have context help for field items), screen “snapshots” are mostly omitted. A discussion of each screen follows below.

Information Screens

The first two or three screens are an introduction to performing network installs. After this, any message that you have added via the `instl_adm` command (discussed above) will be displayed. Press any key to continue past these screens.

Network Configuration Menu

Next is the first input screen. This is where you enter the information you collected above; see *Figure 4* for the input used in this example. Use the TAB or ENTER key to move between fields; type CTRL-X when you have finished entering information here.

An example of creating update packages from files is to create a “patch server” that contains several operating system patches you have determined should be installed on multiple machines.

Combining Filesets

After obtaining the patch files and using `updist` to make the files available on your NetDist server, it is possible to combine multiple patches into one update partition. To do this you need to specify the same destination directory when running `updist` against the various patch `tar` files; `updist` will add each patch into the **MAIN.pkg** file in the destination directory.

Next locate the **netdist.index** file for each fileset. This index will be located under the directory you specified when you ran `updist`. For example, if the source file were named **PHKL_1989.updt** and the destination directory were named **/netdist/9.01patch**, the index file could be found under the destination directory and would be named **700/PHKL_1989/netdist.index**.

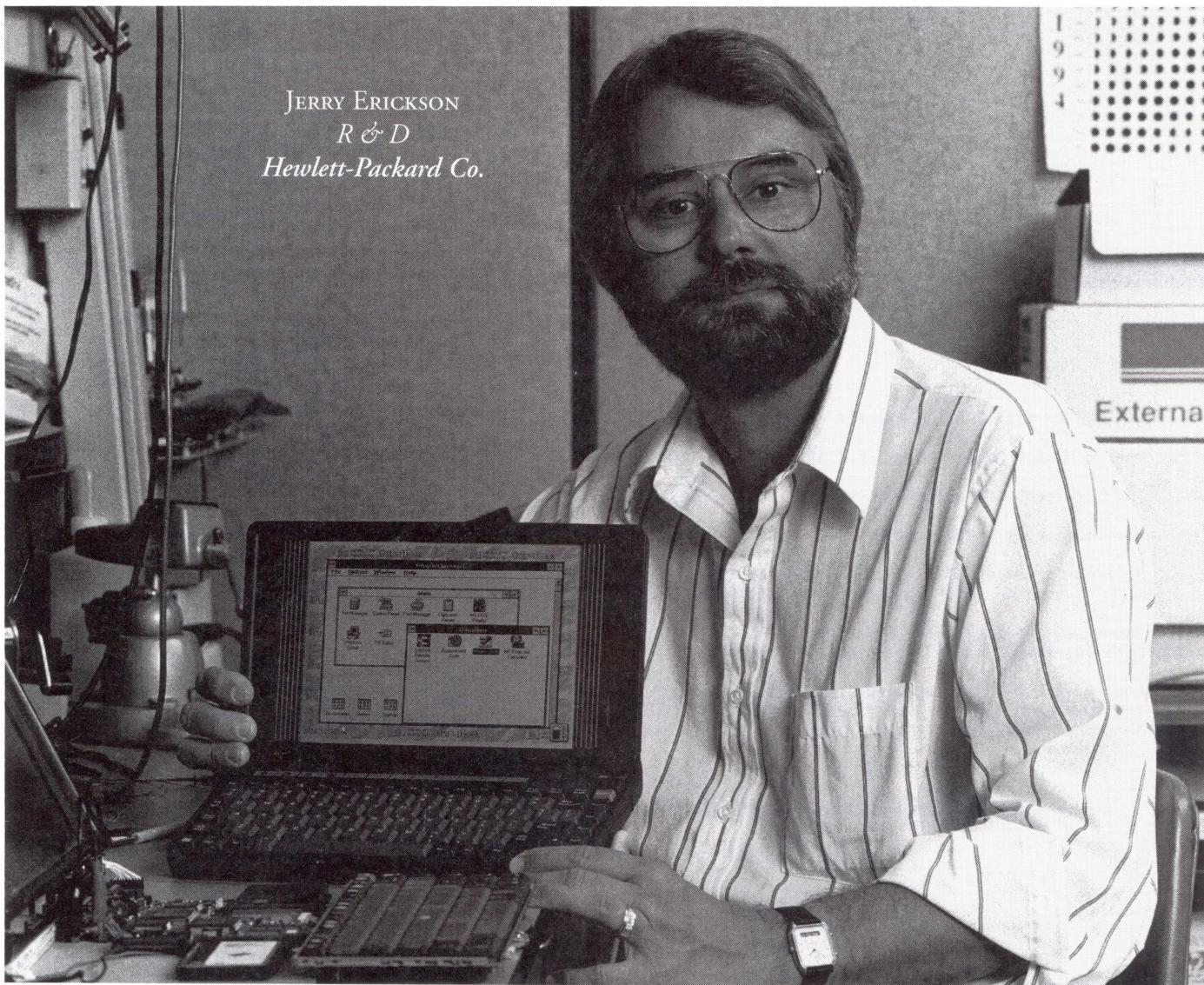
Use your favorite text editor to edit this little index file. Change the line that starts with “**pn:**” and replace the existing partition name with a short meaningful name (in this example we might choose “**REBOOT**”). To add other filesets to this partition simply edit the other **netdist.index** files and use this same name. This name will then appear as a partition when you run `update`, and the patches will appear as a filesets within this partition. You can also add your own partition description by editing the line starting with the “**pd:**” tag. (In this example we might type: “**Patches that require a reboot.**”) In addition, it is possible to add fileset dependencies in the **netdist.index** file; this exercise is also left to the reader.

Selective Installs

Once you have added several patches to your patch server, it may not be appropriate to install all the patches on every target machine. When you run `update` you can select filesets within your new partition just as you would with any partition. An added benefit of installing several kernel patches at once via `update` is that the target machine will need to be rebooted only once.

When adding applications to your NetDist Server, remember that indiscriminate use of network installs can violate software license agreements. One way to avoid trouble here is to install each application in a separate directory and run a `netdistd` server process on a unique port number for each application. This way, it is easy to start a server when you wish to perform an install, and then turn the daemon off again when you are done.

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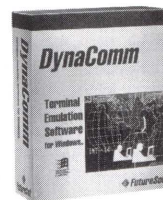
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FIGURE 4 *Network Configuration Menu*

```

HP-UX INSTALLATION UTILITY -- NETWORK CONFIGURATION MENU

Internet protocol address (eg. 15.2.56.1) of this host [15.13.194.21 ]
Internet protocol address of the netdist server system [15.13.200.56 ]
The port number (eg. 2106) of the netdist server.      [9010      ]
The internet protocol address of the gateway system
(If none is needed, enter 'none' or 'not required'    [15.13.192.2  ]
The subnet mask (eg. 255.255.248.0 or 0xfffff800)
(If none is needed, enter 'none' or 'not required'    [255.255.248.0 ]

NOTE: Record the values used above, they will be needed again to setup
the installed system. See "Installing and Administering Network
Services" for setting the netmask and gateway values in /etc/netlinkrc.

CTRL-X = Done, CTRL-U = Undo changes, ? = Help on current item.

```

The system will then initialize networking and verify that it can connect to your NetDist Server. If there are any networking problems, you will be asked if you want to check and re-enter any of the fields.

Root Destination Menu

The next step is to specify which disk will be the "root" disk. The system will display all disks that it identified. To continue our example, it found an HP_C2235 disk at address 6 and address 5. We will select the disk at address 6 as the root disk (see *Figure 5*).

After you enter this selection, an informational screen displays a warning that an HP-UX system may already be on this disk. Press any key to continue.

Root Filesystem Type Selection

You now specify whether you wish to have long or short file names on the disk just selected. Unless you have a specific reason to use short file names, just press ENTER to select the default and use long file names.

Main Menu

You will now see the "HP-UX Installation Utility Main Menu." At this point, if we had only one disk in our Install Client, we would choose the default menu item and continue on with the install. However, since we want to add another disk, we will type "5" to add a non-root disk. The other choices on this menu allow us to modify disk information that we have already entered (see *Figure 6*).

Additional Filesystem Destination Menu

This screen will show the second disk at address 5. If there were additional disks connected to your machine, they would be displayed also. Since we have only

FIGURE 5 *Root Destination Menu*

```

HP-UX INSTALLATION UTILITY -- ROOT DESTINATION MENU

Select one of the following disks (name and system location)
connected to your system to be the ROOT destination device for this
installation. Enter the item number, or highlight the item using
the arrow keys and press <Return>.
If the desired ROOT disk is not listed, make sure it is connected
properly and turned on, then select the "Search Again" item.
If your disk is STILL not recognized, you can use the
"Other disk" item to manually enter the Disk address.

      Disk              Slot Bus Func
      -----
      Number Addr Num
1. HP_C2235_____at_0_6_1
2. HP_C2235_____at_0_5_1
3. Search Again
4. Other disk
5. Exit install

Enter selection [1]

```


one more disk, we type "1" to configure this disk.

Again, after entering this selection, we see an informational screen displaying a warning that an HP-UX system may already be on this disk. Press any key to continue.

Additional Filesystem's Mount Point

After we select the disk to configure, a screen prompts for the path name of the mount point for this disk. In this example type "/usr" and then press CTRL-X to continue on.

Filesystem Type Selection

Again you will see the screen to specify whether you wish to have long or short file names on the disk just selected. Unless you have a specific reason to use short file names, just press ENTER to use long file names.

Additional Filesystem Menu

You will now be presented with an "Additional Filesystem Menu" screen that allows you to change parameters you have entered relating to this second disk. If you do not want swap space on this drive, just return to the Main Menu. Since we want to add additional swap, we type "5" to "Change Filesystem Parameters."

Non-Root Filesystem Parameters Menu

This screen has a lot of information that does not need changing. In the first field we type "36000" for 36 MB and press ENTER. When we press ENTER again, the swap space is rounded to match system constraints. In this case it is rounded to 36126 blocks. We then type CTRL-X to return to the previous menu and then type "1" to return to the Main Menu (Figure 6 again).

Main Menu (again)

Sharp-eyed readers will notice that we have not yet configured any swap space on the "root" disk. At this point we

FIGURE 6 Main Menu

```

HP-UX INSTALLATION UTILITY  --  MAIN MENU

Major   Slot   Bus   Function
Number  Number Address Number  Model  Mount Point
-----
Source:  -1     0    -1     2    Network
Root Device:  7     0     6     1    HP C2235  /

If the destination device shown above is correct, and you
do not want to modify filesystem parameters or add any additional
non-root filesystems, select the "CONTINUE" option below.

1. Continue Installation Process.
2. Change ROOT Destination Device.
3. Change ROOT Filesystem Type.
4. Change ROOT Filesystem Parameters.
5. Add a non-root Disk/Filesystem.
6. Modify/Display non-root Disks/Filesystems.
7. EXIT the Installation.

Enter selection [5]

```

FIGURE 7 Progress Report

```

Major   Slot   Bus   Function
Number  Number Address Number  Model  Mount Point
-----
Root Device:  7     0     6     1    HP C2235  /
FS Device:    7     0     5     1    HP C2235  /usr

Continuing the installation process will destroy
the contents of the disks listed above

Do you wish to continue? (y/n) [ ]

```

could type "4" to "Change Root Filesystem Parameters," but instead this time we type "1" to continue the installation process.

Swap Space Verification

This screen verifies swap space on the root disk swap. For our example, since we have not yet configured any swap on this disk, we type "64000" for 64 MB of primary swap and press ENTER. This value is also rounded up to match system

Cold Network Install Quick Reference

Describing how to set up and perform network installs takes far longer than actually doing them! Once you have a NetDist server configured, here are the steps for a successful cold network install. If you start with your new Install Client in a box, you should plan about half an hour to get the Update/Install running, about one hour for the Install to finish, and about fifteen minutes to configure the workstation after the Install has been completed.

Collect addresses of Servers and Client

- LLA of the Install Server:
- IP address of the Install Client:
- IP address of the NetDist Server:
- Port on the NetDist Server:
- IP address of the Gateway:
- Subnet mask for your net:

(See *Figure 3*.)

Also handy:

- IP address of the Install Server:
- Hostname of the Install Client:

Verify configuration on Install Server

- Filesets for S700 clients (ex. S712): RBOOTD and NET-INSTL-700
- Filesets for S300 and S400 clients: RBOOTD and NET-INSTL-300
- Filesets for S712 clients (req. 9.03): ARPA-RUN and NET-INSTL-700
- Uncomment the "HPS300" line in `/etc/boottab` (S3/400 clients)
- Verify `rbootd` is running (non-S712 clients)
- Verify IP address(es) in `instl_boottab` (S712 clients)
- Verify Install Client is not a Cluster Client

Boot the Install kernel

If the client fails to boot, verify that all the addresses were entered correctly. Also check the jumper setting on the Install Client (see *Figure 2*), LAN cables, correct IP addresses in `instl_boottab` file; and make sure at least one address is available for use (S712 Clients).

Complete the update

Follow the instructions on the Install Utility dialogue screens. After the system reboots, select the filesets you want via the Update/Install screens, and wait for the update to be completed. Then, when the system prompts you, enter the hostname, IP address, and time zone information. Finish the install by adding any system files you need (e.g., `/etc/resolv.conf`, `/etc/passwd`).

constraints. Now press CTRL-X and we're almost done with the dialogue screens.

Last chance to make changes

You will now see a screen that reports your progress so far (shown in *Figure 7*). At this point we should see a Root Device at address 6 mounted on "/" and an FS Device at address 5 mounted on "/usr." This is the last chance you have to make any changes; continuing now will destroy the contents of the disks listed. Since we're sure that everything is right, we type a "y" to continue.

Next the install kernel will initialize and mount the disks, install the update tools, and then reboot the system to the newly formatted disks. Once the system comes back up, you will be presented with the Update/Install screen.

HP-UX Update Screen

At this point you will see the "Distributed Update/Install" Main Menu with your NetDist Server as the source and your local "root" disk as the destination. Simply select the filesets you wish to install on your new machine and complete the update as you would normally when using a tape or CD-ROM device.

Completing the Installation

After the update finishes, the system will reboot once more. This time there is no need to interrupt the boot sequence. While the machine is booting, the `/etc/rc` script will determine that this is a new machine and prompt you for the hostname, IP address, time zone, current time, and root password.

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CIRCLE 160 ON READER SERVICE CARD

cold network installs

Once the workstation has completed booting, you can log in, and using the IP address of the Install Server, you can run *ftp* and get any files you need to complete the installation (e.g., */etc/hosts* or */etc/resolv.conf*) and make any changes to */etc/netlinkrc* necessary at your site. This is when having the IP address of your Install Server comes in handy as your Install Client does not yet know any other "hostnames."

Summary

Being an effective system administrator at a large site can be a demanding task; make it easy on yourself whenever possible. Using a NetDist Server allows you to ensure consistent, reliable installations of new workstations including the operating system, application software, and OS patches. (And you won't have to worry if you'll ever get back those install tapes that people keep borrowing!)

Here in Cupertino, our group of six system administrators supports about 50 clusters (over 800 workstations), about one hundred S800 "time-share" machines, and hordes of PCs on 10 subnetworks in four buildings. Using the network to install and update software allows us to do our jobs with greater ease, efficiency, and accuracy. ■

REFERENCES

For further information see the HP-UX "man" pages *fbpkg(1m)*, *inetd(1m)*, *instl_adm(1m)*, *instl_bootd(1m)*, *rbbootd(1m)*, *rmfn(1m)*, *netdistd(1m)*, *update(1m)*, *update(4)*, *services(4)*, *tar(1)*, *tftp(1)*, and *tftpd(1m)*, and the manuals *HP-UX System Administration*, *Installing and Updating HP-UX*, and *Solving HP-UX Problems*.

World Wide Web users can obtain a full set of the dialogue screen examples used in this article along with several shell script examples that can help manage your NetDist server. Use Mosaic to access the Uniform Resource Locator (URL) shown in the byline below. (If you are not yet using Mosaic, you're really missing the boat—it's the slickest thing since sliced silicone, but that will have to be another article!)

Chris Cobb is a productivity engineer at HP's HP-UX and MPE R&D Labs in Cupertino, California. His e-mail address is cobb@cup.hp.com and his Web URL is <http://www.cup.hp.com/~cobb>.

Software Review

by Larry Headlund

Reflection X Connectivity Suite

REFLECTION X CONNECTIVITY SUITE: Reflection X Version 4.0 (Reflection X server, Reflection FTP for Windows), Reflection 2 for Windows Version 4.01, TCP Connection Version 2.02

Minimum Configuration:

- MS-DOS 3.1 or higher
- Microsoft Windows 3.1 in enhanced mode
- 80386 IBM PC-AT, PS/2, or compatible computer
- 2 MB RAM
- Disk: 4.0 MB for Reflection X
 - 3.4 MB for 75 DPI Fonts
 - 4.0 MB for 100 DPI Fonts
 - 5.3 MB for HP fonts
 - 3.0 MB for DEC fonts
 - 0.7 MB for Andrew Toolkit Fonts
 - 4.3 MB for JIS and Korean Fonts
 - 1.0 MB for Reflection FTP for Windows
 - 4.0 MB for Reflection 2
- Microsoft Windows-supported display adapter
- 2- or 3-button mouse
- Network interface board

Tested Configuration:

- HP Vectra RS/20C (20-MZ 80386)
- 4 MB RAM
- Monochrome VGA monitor
- Logitech serial mouse
- NC2000 Ethernet card

Reflection and WRQ are familiar names to the HP community. They have long supplied the best known PC-to-MPE (HP 3000) connection software. In fact, when I first heard the name Reflection, I thought of PCs emulating HP terminals and transferring files back and forth. Visions of COBOL and FORTRAN code danced in my head. WRQ also has vast experience creating products to talk to Vaxen and IBM mainframes. It is logical for a company with this background to get into the exploding X terminal emulation market. And get into it in fine style they did.

At-a-Glance

Reflection X Connectivity Suite:

Reflection X Version 4.0 (Reflection X server, Reflection FTP for Windows), Reflection 2 for Windows Version 4.01, TCP Connection Version 2.02

Walker Richer & Quinn, Inc.
1500 Dexter Avenue North,
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800-92NETWORK

Documentation:

User's Manual, 173 pages

Price:

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CIRCLE 165 ON READER SERVICE CARD

software review

Why X emulation software?

Why is there a market for software that turns a PC into an X terminal or allows X programs to be displayed on a PC? Some would say that anything you do to a PC running MS-DOS and Microsoft Windows is bound to be an improvement. But UNIX and/or X fanatics aren't the target market (they already have workstations or X Terminals). The appeal isn't cost savings. A PC with X emulation software can't be an economical replacement for a real X terminal. By the time you buy a PC, monitor, extra memory, disk, networking hardware, and software, you have spent as much as or more than it takes to buy a low-end X terminal. And

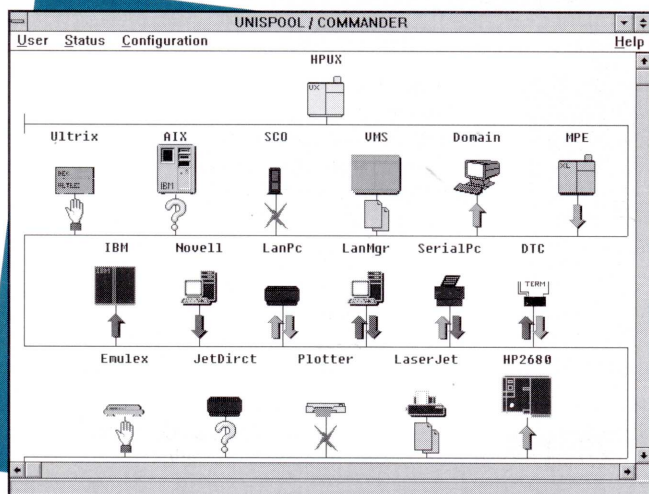
high-end PC video is low-end resolution for the X market. A network of PCs is a lot more work for the system administrator than the same number of X terminals. Having potentially independent systems with their own local storage has the potential for incompatibility problems and update woes.

Yet there is a market for X on PCs. I think the answer lies in the installed base and dual use. The comparison above started out with a clean slate. We don't have the luxury of a fresh start often enough. If you already have the PC hardware, a software-only solution is cheaper than new X terminals. Even if you aren't already networked, the price of PC network cards (\$75 to \$150) is small enough

to make the upgrade reasonable. The other factor is dual use. Sadly, most of corporate America has MS Windows as its desktop environment and is firmly attached to the applications on it they have bought and learned. So they already have a PC that they are not going to give up. Even if money were not a concern, precious desk real estate concerns would rule out two tubes, one for X and one for Bill Gates. (An alternative to X on PCs is PCs on X. That is, products such as SoftWindows from Insignia Solutions or the WABI initiative, which run Microsoft Windows on top of X. But that's another story.)

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CIRCLE 148 ON READER SERVICE CARD

software review

Walker Richer & Quinn has made a product for which there is a need and therefore a market.

TCP Connection

Reflection X works with all the usual suspects if you already have networking software installed. If not, WRQ's version of the TCP/IP stack is available. On my base machine, about as wimpy a machine as you find in use these days (20 megaHertz 80386, 4 MB RAM, monochrome VGA monitor), installation was no problem. To be fair, I already had the network card installed and TCP/IP working with different software. I installed WRQ's TCP Connection instead of the existing software and, except for a little

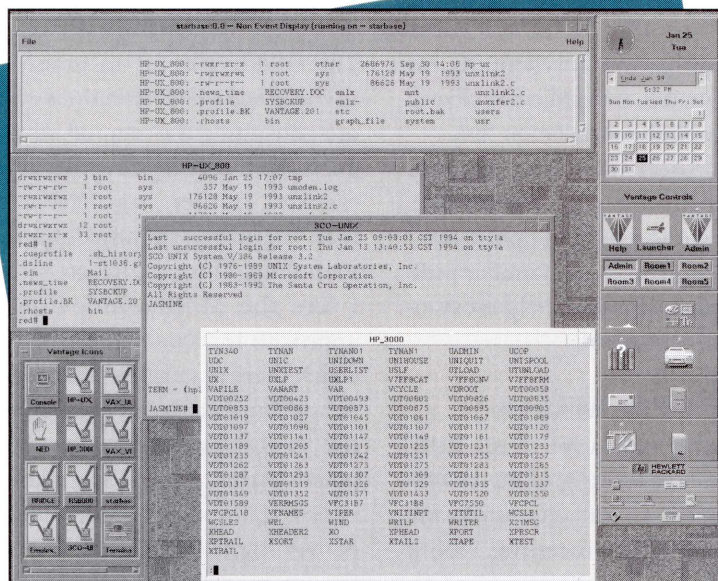
magic to find my card's address and interrupt setting, the installation went smoothly. I wouldn't have needed the magic if I had written the information down, but why make life easy?

To test a more typical scenario, I also installed TCP Connection on an unnetworked machine with a new network card. Well, not really new, one they had sitting around. What followed was the usual PC nightmare of memory collisions, guess the card settings, "it usually works best with IRQ x," "let's unload everything and add things one at a time," etc. We finally sacrificed a goat and got the thing to work. I can't blame this on WRQ. When I did another install on a fresher machine (we even had all

the hardware documentation), everything went smoothly.

The install program for TCP is executed from the DOS prompt and is not a Microsoft Windows program. As this should tell you, TCP Connection is not implemented as a Microsoft Windows DLL. The diagnostic programs, such as *ping*, are run from the DOS prompt. TCP Connection can work from the DOS screen inside of Windows. TCP Connection is a good citizen for compatibility. You can access it through the Hewlett-Packard or Microsoft socket library. It supports the portion of the NetIPC specification used by such Hewlett-Packard applications as AdvanceMail and NewWaveMail.

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CIRCLE 115 ON READER SERVICE CARD

software review

The install program walks the user through all the choices to be made, with appropriate default values. The only place I had to change the defaults was in number of connections. The defaults are two telnet and two LAT sessions. With no DEC's at my site, I had no need for the LAT capability and it turned out that the way I used Reflection X with HP VUE I needed more than two telnet sessions. This was the only time I had to twiddle the values or read the manual.

Installing Reflection X and Reflection 2

Good installation software makes dull reviews. I installed both packages as smoothly as silk. These two are installed

from Microsoft Windows, and about the only decisions you make are the names of the target directories and the fonts to install. If you don't have a previous version installed, then use the default directories. Which fonts to install is a balance between your available disk space and your X needs. The easy choice is the Japanese and Korean fonts. If you don't use either language, then you can leave them off for now, *n'est-ce pas?* It is easy to load additional fonts after install if they are needed. For the 75 and 100 DPI, HP, DEC, and Andrew fonts, that will depend on which applications you use.

Speaking of disk space, be sure you have enough space on your primary drive for Microsoft Windows' version of

swap. This bit me the first time I installed. An experienced Microsoft Windows user already would have run into this problem and corrected it, but if you haven't, allow 10 or more megabytes for swap.

You aren't restricted to WRQ-supplied network software. During the installation of Reflection X and Reflection 2, you are presented with a shopping list of available networking products. All the usual suspects are there, including Novell.

Reflection 2 for Windows

Reflection 2 is WRQ's terminal emulator product. As such, it includes facilities for serial communication. In fact, serial communication with HP and DEC minis

was WRQ's bread and butter for years. Reflection 2 provides basic facilities for modem communication. It can connect and disconnect and deal with the magic incantations of the AT command set. As a convenience, it will also maintain a small phone book (maximum five numbers) for autodialing. When you have a network connection, you use Reflection 2 instead of telnet.

Which brings up a question. The Reflection 2 package is available separately for the X Window package, but is bundled as part of the Connectivity Suite. Why would anyone want it? After all, if you want to access a character-based application, that's what *xterm* and *hpterm* are for. So isn't another terminal emulator tool superfluous?

Not quite. First off, all your communication may not be through a network. When you are communicating with a host with a serial line, you need some alternative to X over serial lines. Besides terminal emulation, Reflection 2 provides file transfer capabilities within a session. It supports xmodem, kermit, and two of its own proprietary transfer protocols. This alone would lead me to use it in preference to vanilla telnet in a network environment. Reflection provides robust and extensive DEC terminal emulation. Much more robust and extensive than MIT *xterm*. And Reflection provides emulation of the VT52, VT102, VT220, and VT300.

Reflection 2 provides an important service by supporting DDE (Dynamic Data Interchange). This allows it to act as a conduit, a utility for gathering and reporting information to and from the outside world for other DDE-aware programs. An example of this is using Reflection 2 to gather information from a central database to be presented in real

time as a pie chart on the client PC. An example of just this, using Microsoft Excel, is included with the installation disk.

As a Microsoft Windows program, Reflection 2 presents a user-friendly face. It allows dynamic setting of options and personalities through the familiar pull-down menus. The online help is extensive and well organized.

Reflection FTP for Windows

One of the main uses of my Intel machine is as a stopping ground for files from the heathen world en route to my HP-UX box for real processing. Going the other way, from the 'Net or the CD-ROM attached to my workstation to the PC is another well-worn path. While the public domain kermit or [xyz]modem can be used to transfer files over a network, ftp is the tool of choice. Interestingly, Reflection FTP is presented as part of the X Window package from WRQ, not bundled with their network package or with Reflection 2.

Reflection FTP for Windows is a real bells-and-whistles implementation. You get a full GUI implementation with file selection and display and directory navigation on both sides of the ftp connection implemented through MS Windows widgets and buttons. The interface is full WIMP (Window, Icon, Mouse, Pointer) with the transfer actions and mode settings represented as icons. When you are transferring a file, the size and portion transferred are dynamically displayed in a bar at the bottom. It includes a listing of some anonymous ftp servers to get the user started. When connecting to an anon ftp server, it will fill in "anonymous" as the user name (avoiding those embarrassing typing mistakes).

Reflection FTP is set up with a full palate of icons for all the ftp actions.

This could make for an amusing game as you guess which icon does what without consulting the manual. As you may guess, icons are a pet peeve of mine. I can read. Further, I usually share a common language with my computer. Why then should I communicate by picture? I like the Motif window manager approach for iconized applications in which there is a picture with text underneath. But I can't fault WRQ here. All the actions can also be accessed through pull-down text menus. You also have the option of dropping the GUI entirely and converting the window to the familiar ftp command line interface. An even more useful option is the split screen mode. In this, the lower half of the screen shows the ftp commands being executed and the server's responses. This is excellent for the beginner who may someday have to face a command line interface ftp implementation and is, of course, an essential tool for debugging connections.

I like Reflection FTP so much I think they should consider selling it separately or have a bundle with Reflection and Reflection FTP. Plenty of people with just occasional contact with UNIX systems, but not with X, would appreciate it.

Reflection X

Finally we come to the heart of the matter. Reflection X lets your PC access X programs on remote machines. I almost wrote "your networked PC" there. But Reflection X does support slip connections so you could run X over a serial line. I wouldn't recommend this for any but text-based programs over a high-speed line, but it's your time.

Note that I said access X programs, not turn your PC into an X terminal. There are two major ways to use

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CIRCLE 152 ON READER SERVICE CARD

Reflection X. One way is indeed to turn your entire screen over to X. If you were connecting to an HP machine in this mode, you would first customize Reflection X's connection item. For example, you can choose always to connect to one particular machine, or you can broadcast and use the first one that accepts you. Just like an X terminal. After choosing to connect, you would see the familiar VUE login screen. From this point on, you are just another X terminal to the host machine. Your look and feel are controlled by the host machine. There are some things you can do differently. If you iconize the Reflection X application, you are back in the MS Windows environment. You can cut and paste between your X applications and MS Windows. With enough memory, you can have multiple X sessions on multiple hosts.

I have a suggestion if you go this route. Unless your PC has an exceptionally large high-resolution monitor, comparable to the ones on workstations or X terminals, you are going to want to set your default font as small as possible. A font that makes for comfortable viewing on a high-resolution screen is too big to be useful on the typical PC screen. Something like HP's Motif calendar program would fill the entire screen. This is not something you would expect an X server to compensate for. Resolution independence is resolution independence, after all. I have found myself setting up separate accounts on the host machine so that I will have distinct environments. Typically I will have a different set of default applications launched also. Reflection X comes with Fonts for all the standard HP apps, but I regret to inform you that the (unsupported, contrib section) xGammon uses

a different set of fonts and will not display on Reflection X out of the box. This alone can be a productivity boost.

The other way you can use Reflection X is a much less common feature in X emulation products. You can launch individual X applications from within your MS Windows environment. If you just need an xterm, for example, or a graphics program or any other tool, it becomes just one more application on your desktop. As you would expect, this is done by remsh of the application on the host machine. You can cut and paste between all the applications on your screen, not caring if they are X in origin or local. If you have a user who is very comfortable in MS Windows, or very uncomfortable in X, this is the way to give him access to the wonders of the X world.

Now is a good time to talk about what Reflection X is not. It is not an X on the PC product like DesqviewX from Quarterdeck, which gives you a local, stand-alone X environment on your PC. All the X interactions depend on the remote machine. Reflection X is not an X programming environment. It can be embedded in applications using DDE in its host environment of MS Windows. You can access the host machine's X applications and display them on your local machine, but Reflection X does not do the inverse, allowing you to run DOS/Windows programs from your host machine. By the same token, you cannot use an X terminal to access programs on the machine running Reflection X.

New Features

By the time you read this, Release 4.2 of Reflection/X should be available. Anticipated features include the ability to run X over serial lines, automatic

client launching, and improved performance. Also available in this time frame will be a VxD/DLL-based TCP stack to free up conventional memory.

Conclusion

I think it is obvious that I like the Reflection Connectivity Suite. The product worked in demanding (read underpowered) environments where others failed. Installation was smooth and performance was exceptional. I particularly liked the feature in Reflection X that allows X programs to coexist on the MS Windows desktop. About the only reason I can see to buy another product with fewer features is if you need only very occasional and limited access and if price is an overriding concern.

You can get X on a PC cheaper, but you can't get it better. ■

Larry Headlund is president of Eikonal Systems and has been working with commercial UNIX since 1982 and with X since 1988. He can be reached at (617) 482-3345 or lmh@world.std.com.

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Sola 700 and your network. Doesn't that have a nice ring to it?



Illustration by Zita Asbaghi

"FILE: TABLE IS FULL"

"INODE: TABLE IS FULL"

WHY DO I GET THESE MESSAGES?

UNDERSTANDING SOME SYSTEM PARAMETERS

TWO OF THE MOST COMMON MESSAGES that a system administrator does not want to see look remarkably alike. These messages

FILE: TABLE IS FULL

INODE: TABLE IS FULL

usually result in applications quickly coming to a crashing halt. (File *open* calls will receive an *errno* 23 *ENFILE* and few if any applications are written to retry in case a table entry has become free.) Worse, the bigger the system and the more it is used, the more likely it is that one of these messages will appear on the system console. What do they mean? How do you prevent them from occurring? What do you do when the dreaded words appear?

by John A. Pezzano

NFILE: One for Everyone

For every process that opens a file on the system, a file table must be set up. Even if a process never explicitly opens a single disk file, the input, output, and standard error devices are automatically opened for each process. So a simple shell command line with just three processes listed such as

```
ps -ef|grep getty | more
```

means I have seven (yes, 7) files open—one for each pipe input and output, and three more that the shell has open so each process has standard input, output, and error files. Now

multiply that by the number of windows I might be using on a workstation or the number of sessions using Terminal Session Manager, then multiply *that* by the number of users on other terminals, X displays, or local area network telnet connections, and it is no wonder that the system cries *Enough!*

For every file opened by a process, there is an *nfile* entry. If ten processes open the same file, then there are ten entries. Child processes, if they explicitly open new files (rather than writing to the ones their parent has opened), need their own entries. Having extra entries gains nothing. Once a file is closed, the entry will be used for the next open request so having one more than is ever used is sufficient. Of course, if you knew that number, you would not need to worry about the problem in the first place.

Nfile entries contain information such as:

- current location pointer within the file
- file open flags (read, write, append, etc.)
- pointers to control routines

NINODE: One for Every File

Unlike the *nfile* parameter, there is only one *ninode* entry for any file that is open. So if ten processes open a single file, then there are ten *nfile* entries but only one *ninode* entry. Each one contains certain information about the open file, including:

- disk on which the file resides
- count of opens
- inode number
- duplicate of disk information (permissions, ownership, time stamps)
- pointers to data

What Happens When I Run Out?

For both the *nfile* and *ninode* parameters, the lack of an entry means the sudden and unexpected failure to open a needed file. For most applications, this means error and usually termination of the process. Since this can happen to any program that happens to ask for the *n*+1th entry, the failure to open a file can mean the database main program has an error, the superuser cannot log on to fix the problem, or a user suddenly has a process that used to work but now fails to run successfully. However, as soon as an entry is freed up by a process closing a file or just terminating normally (*nfile*) or by the last process using a file doing the same (*ninode*), the

system can continue on its merry way. But the destruction may have been done, so it is best to get users off quickly, increase the parameters in the kernel, and reboot a kernel with larger numbers. In most circumstances, the process that causes the console error message is not a critical one and simply reducing the number of users or having them not do so many simultaneous things will keep the numbers from hitting their limits until a convenient time or day can be found to fix the problem and reboot with a new kernel. Of course, the best solution is never to let the problem get to the critical stage in the first place.

Avoiding the Problem—Plan Ahead

Both the *ninode* and *nfile* parameters are initially set to formula values based on other system parameters. The principle one, *MAXUSERS*, has nothing to do with user licenses and is typically set to 32 in a Series 800 Business Server or a Series 700 Workstation. A knowledgeable and experienced system administrator will calculate *MAXUSERS* and set its value not on how many people log on but on how many sessions are in use. The administrator might even increase this parameter or adjust the formulas based on the expected usage. Do users run lots of processes? Do I have a large number for *nproc*? (This parameter will be discussed later.) Do I run processes that open lots of files? Does everyone share only a few? Once these questions are answered, the initial value of *nfile* and *ninode* can be set.

Once the system is in operation, the use of system performance tools can provide information. On a Series 800 Business Server, the *sar* command:

```
sar -v <number of seconds between checks>
                        <number of intervals>
```

can tell if *nfile* or *ninode* is hitting its limit. Similarly on all HP-UX systems, the performance monitor *glance* will show similar information (see *Figure 1*).

If *nfile* is nearing its limit at any time, it is a good idea to increase its value. However, the conclusion is not so simple for *ninode*.

How Many NINODES Do I Need?

Every time I have a file open, I use an *ninode* entry. This entry remains in use until the last process using the file closes it. In addition, if I specify a path to a file, I will use a *ninode* entry for each directory in the path. However, these entries can

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FIGURE 1 Using *sar* or *glance*

An example of *sar* is:

```
sar -v 1 5
```

This would check every second for five seconds.

The output would look like:

11:04:12	text-sz	ov	proc-sz	ov	inod-sz	ov	file-sz	ov
11:04:13	N/A	N/A	91/276	0	353/356	0	203/680	0
11:04:14	N/A	N/A	91/276	0	353/356	0	203/680	0
11:04:15	N/A	N/A	91/276	0	352/356	0	203/680	0
11:04:16	N/A	N/A	91/276	0	313/356	0	203/680	0
11:04:17	N/A	N/A	91/276	0	270/356	0	203/680	0

The *ov* field would show a non-zero value when the error messages print to the console.

For *glance*, you would go to the System Tables screen and would see the following on page 1:

	Available	Used	Utilization	High
File Table (nfile)	680	204	30%	30%

On page 2, you would see something like the following:

	Available	Requested	Used	High
Inode cache (ninode)	356	356	356	356

be used again if necessary. Once I close a file, the system keeps the entry on its free list just in case another process happens to want to open the file again. So if I type

```
vi /tmp/datafile
```

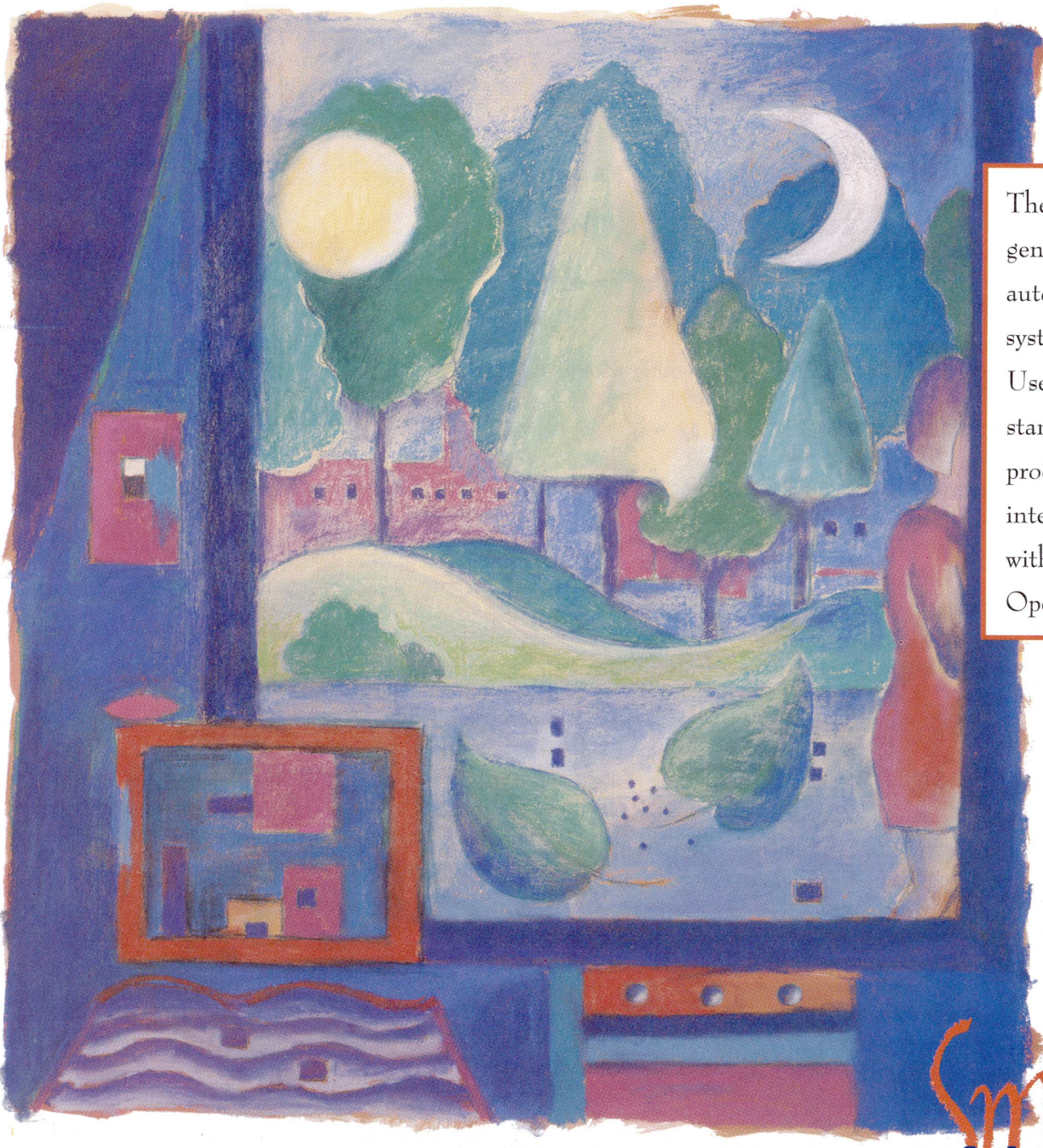
I will have used *ninode* entries:

- */*, */usr* and */usr/bin* (3 entries) for the path to the *vi* program.
- */*, */tmp* and */tmp/datafile* (2 more as */* is duplicated) for the file being edited.

In addition, my terminal will have another entry (shared by *vi* and my shell). Of these entries, the four directory inodes will

be kept after *vi* terminates but the one for datafile will be freed.

Opening new inodes is expensive. For each path entry (*/usr*, */usr/bin*, */tmp*), I have to make a disk seek and read to the directory to get the inode number of the item I am looking for, then a seek and read of the inode table to read the contents. Thus, I can save about half my disk reads when path searching if I keep the directory inodes around. So to get better performance, the system has *inuse* inodes for active open files, *directory* inodes, and *free* inodes (never used or files closed). If an entry exists, it is used. If not, a free one is allocated. If no free ones are available, the system clears the directory entries and uses one of those. Thus the ideal situation is to have enough inode entries for every open file plus every directory I use. Unfortunately, this is not so simple.



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FIGURE 2 *Formulas for Parameters*

The values of *nfile* and *ninode* are formulas based on other parameters. For *nfile*, the formula is

$$(16 * (nproc + 16 + MAXUSERS) / 10 + 32 + 2 * npty)$$

so this parameter depends on both the number of pseudo-ttys (*npty*) as well as the number of processes and users.

For *ninode*, the formula is

$$((nproc + 16 + MAXUSERS) + 32)$$

You can always set specific values rather than using the formulas.

There are two problems with this concept:

- First, a command such as *find* can walk through every directory in the system, even those that may never again be used until I back up the files or use *find* again. Since having an inode entry for every directory is wasteful, using the worst case of having an entry for every directory opened is not practical.
- Second, there is no tool that differentiates between open inodes and inodes used for directories. It is almost impossible to tell whether I have enough as the system will always use all that are available at some time, freeing the directory ones only when necessary. It is only when the console message appears that I truly know I did not have enough.

Because of the performance hit that is taken when searching paths, having lots of extra inodes can improve system performance by reducing disk I/O. Since the system puts all its directory entries on the free list when there are no free entries, any sudden decrease in the number used when observed by *sar* or *glance* is an indication that more may be beneficial. Of course, this may also mean that a number of files were just closed, but that is less likely.

Is There an Easy Way?

Besides doing calculations up front, observing the system on a regular basis with performance tools, or just waiting for those dreaded console messages, there is an easy way to limit the problem.

First, set the *MAXUSERS* parameter based on the number of expected sessions, not users. Change it, when convenient, as the number of users on the system grows. Set *nproc* for the total number of processes. As with *nfile* and *ninode*, if you have too many processes, you will get:

Process: Table is full

You will need to increase the value of the parameter *nproc* just as with the file parameters.

Second, if the message occurs, just double the values for *MAXUSERS*. If it happens again, double it once more. *Ninode* should be bigger than you think as it can affect performance (see *Figure 2*).

Conclusion

Do not wait for the console messages. Set the *MAXUSERS* parameter appropriately up front and adjust it as necessary. Set parameter *nfile* so you have enough for every file open. Set parameter *ninode* as big as reasonable because every directory path that has to be searched requires two disk accesses. Use the available tools to observe whether you think you need bigger numbers and adjust them before you see

TABLE IS FULL



John A. Pezzano is an HP Response Center engineer in Atlanta, Georgia. Before moving to Atlanta, he spent seven years in the HP office in El Paso, Texas, supporting HP-UX systems.

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CIRCLE 99 ON READER SERVICE CARD

by Bill Bowman

Desktop Management GROWING UP

The computer industry is seeing a shift to distributed computing environments populated by increasingly powerful desktop systems. These desktop systems are networked together supported by servers running network operating systems (e.g., client-server.) As desktop systems are deployed throughout customer environments, their management and support are becoming strategic issues. Fortunately help is on the way from a variety of sources. Lessons from the years of experience in network management are starting to be applied to the problems of desktop management. This will enable integrated management for desktop systems and networks from a single console. The convergence of network and system management is fortunate given the diminishing boundaries between networks and systems.

One very important lesson from the evolution of network management is the important role of standards in managing heterogeneous environments.

This article will look at this impact of the evolution of network management and then discuss three groups that are working to make desktop management a reality by focusing on desktop management standards. These groups are:

1. Distributed Support Information Standards (DSIS) Consortium
2. Internet Engineering Task Force (IETF)
3. Desktop Management Task Force (DMTF)

Lessons from Network Management

It has been five years since RFC (Request for Comment) 1067 was published describing SNMP (Simple Network Management Protocol). This was followed shortly by RFC 1155, which describes how device information is structured so management stations can understand information from disparate networked devices.

In many ways the problem that SNMP solves for networks is similar to

the problem of desktop management: the problem of geographically distributed devices from multiple vendors needing to be remotely monitored and managed in a common manner. When a problem occurs in either environment, often the symptom is not indicative of the root cause. For example, if a user is having a remote print problem, it could be a spooler problem on a print server, a PC configuration problem, a printer that can't understand a document print language, a network configuration problem, or....

A key ingredient to the success of SNMP has been its pervasive implementation by network device vendors. If an environment is to be managed effectively, all devices must speak the same language. Over the last five years network vendors have built SNMP support into their products as the common management language. A key part of SNMP's success has been the development of standard sets of information called MIBs (Management Information Bases). Standard MIBs have spawned

the growth of applications necessary to turn raw data into knowledge for both predictive (e.g., performance management) and reactive (problem isolation) services. The IETF has been active in the development of standard MIBs, which have enabled multivendor network management applications. Today there are about 15 MIBs under various phases of review within the IETF. Standard MIBs mean users need only one application

to manage a set of devices (e.g., HUBs) independent of vendor.

Also fueling the growth of SNMP have been significant advances in open management platforms (e.g., HP OpenView, Sun SunNet Manager). Platform vendors are working hard to give application developers a productive development environment by providing a rich set of services such as databases, event management, and GUIs. Several companies

now exist for the sole purpose of developing and selling applications for these open platforms.

The Desktop Management Problem

Workgroups that have benefited from adopting network computing are now becoming aware of the hidden costs of managing these environments. Merging these local environments into site or enterprise networks can create major headaches for both central IT departments as well as the local workgroups whose productivity increasingly demands global information access. IT groups are being asked to take on the responsibility of supporting these disparate environments, which often do not have the procedures or standards in place to ensure a reliable and secure computing environment.

Often, support for these workgroups has been provided by setting up Help Desks either to direct calls to specialists, or if possible to respond immediately to common questions. One of the first pieces of information needed by a remote specialist is the answer to some questions. What does the user environment look like? What machine does the user have? How much memory? What applications are loaded? What versions are they?

Site support may try to keep inventory information about the user's machine, but no sooner is the information collected manually and entered into a database than it is obsolete!

Besides configuration information,

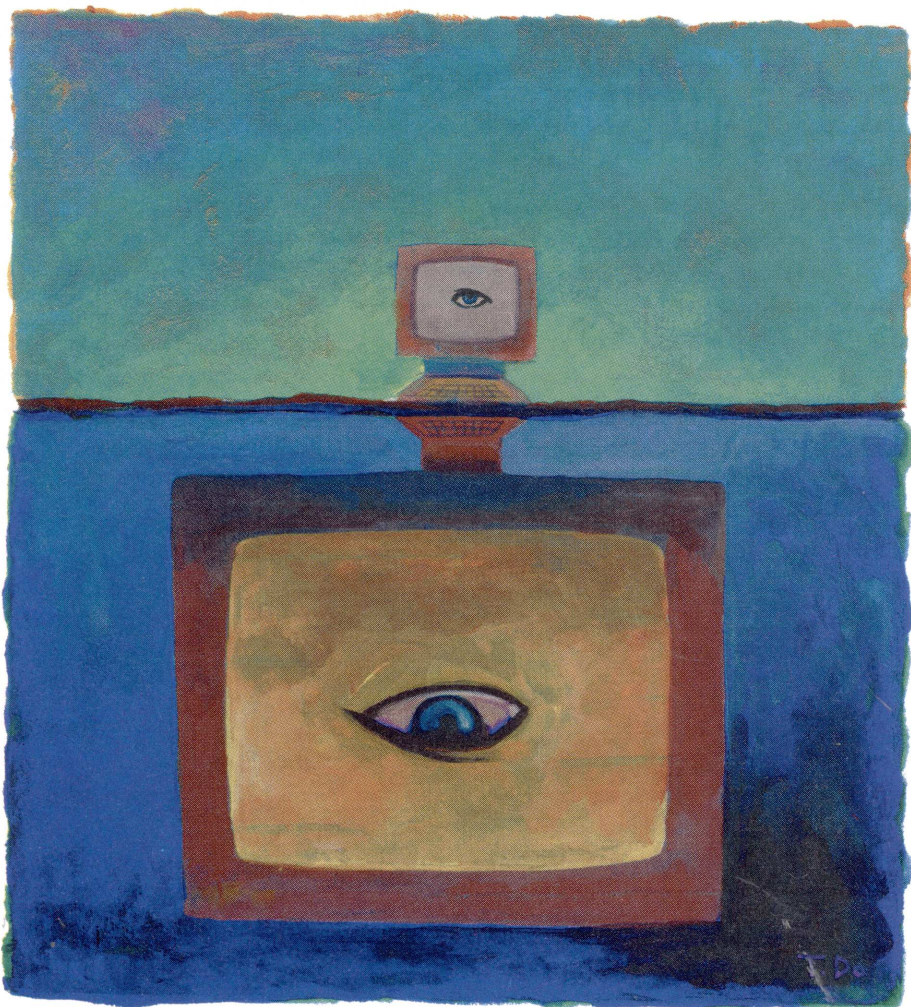
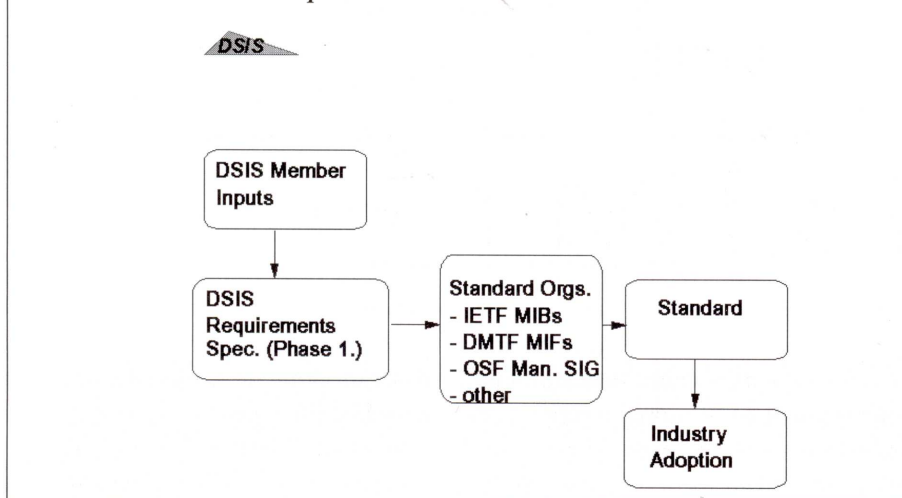


Illustration by Thien-Do

FIGURE 1 *From Requirements to Standard*

it also is useful to know hardware states (e.g., the printer is off-line). Often the user doesn't know this. All users know is that for the last six months they have been using a word processor to print to a printer sitting on a stand at the end of the aisle, and today it doesn't work.

The poor Help Desk Administrator may end up dispatching a service person to solve a printing problem. This is an expensive and time-consuming task. If standard management information about the desktop environment were available, remote troubleshooting tools could be used to help the user quickly complete the print task.

A key first step in solving the desktop management problem is to have a way for a machine to report remotely its HW, SW, and NW configuration as well as major state (e.g., ON/OFF Line) variables. Today several vendors have proprietary desktop MIBs that attempt to do this. The problem with proprietary MIBs is that Help Desks must use different tools depending on the user's system (e.g., HP or Sun), and even the same information may be reported

differently by different vendors (e.g., memory in kilobytes or megabytes).

Desktop Management Standards Activity

Several groups are now working in the area of desktop management standards and at least one vendor has announced a product supporting a standard desktop MIB. DSIS (Distributed Support Information Standards) Consortium, the IETF (Internet Engineering Task Force), and the DMTF (Desktop Management Task Force) are three groups that have been active in leading the movement to standards for desktop management.

DSIS

The Distributed Support Information Standards Group (DSIS) exists to promote the standardization and deployment of support and management information across multivendor environments from PCs to mainframes.

DSIS was founded August 4, 1991 by an initiative from Bell Atlantic Business Systems Services. Membership today includes Hewlett-Packard, Microsoft,

IBM, Digital Equipment, Sun Microsystems, EDS, Olivetti, ICL PLC, HaL Computer, Tandem Computer, Bell Atlantic Business Systems, Unisys Corporation, Proteon Inc., Landmark Systems, and October Technologies. DSIS was the first consortium specifically aimed at developing requirements for support and system management information.

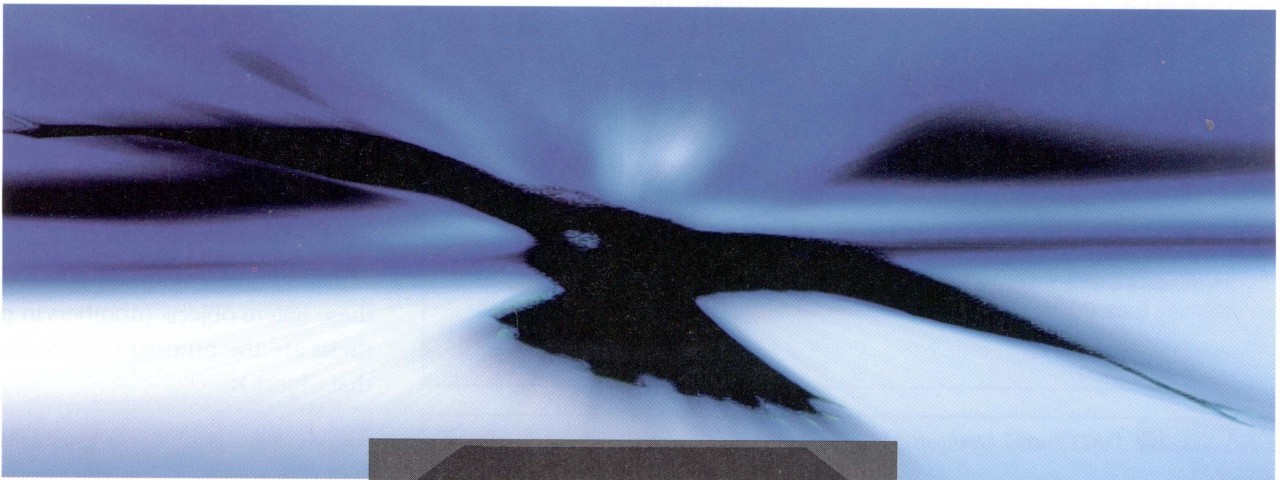
The DSIS consortium does not generate standards. Rather DSIS develops information requirements from the standpoint of support providers. The specification is in a protocol-neutral form which can be translated to specific management protocol environments. The specification is given to existing standards groups developing standards for system and network management. Besides the IETF and the DMTF, DSIS has shared its requirements specification with X/Open, COSE, and OSF. *Figure 1* illustrates the relationship between DSIS and the standards setting process.

In mid 1993 DSIS released its Requirements Specification Phase 1. The DSIS-specification was developed over a one-year period using the combined resources of member companies. The first step was for each member to go back to his support organization and ask them what kinds of information were most frequently needed to resolve support problems. These organizations were primarily telephone response groups doing remote phone-in support. The responses were grouped by area, e.g., SPU, Operating Systems, Printers. *Figure 2* illustrates DSIS information for a printer.

Early on, DSIS recognized the importance of having guidelines for selecting the information that should be part of the DSIS specification. Ideas for guidelines came from the years of experience in developing and using

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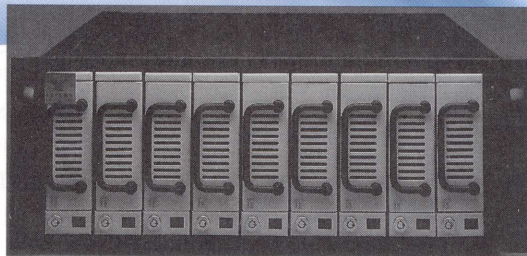
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FIGURE 2 *DSIS Printer Information*

Standard Information

Standard HW

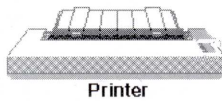
- Manufacturer
- Model
- Serial No./Rev.
- Physical Loc.

Standard Status

- Operational State (e.g., enabled)
- Usage State (e.g., busy)
- Availability (e.g., available)
- Admin. Status (e.g., unlocked)

Standard Error

- Fatal Error Count
- Major Error Count
- Warning Error Count



Printer

Specific Information

Current Error

Jammed, No Paper, Door Open, Toner Low, Low Paper, Other

Printer Type

Laser, Thermal, Impact, Other

Pages Printed

(Extended Attribute)

Number of Sides

(Optional Attribute)

standard information for network management. Below are some of the key selection criteria for DSIS information:

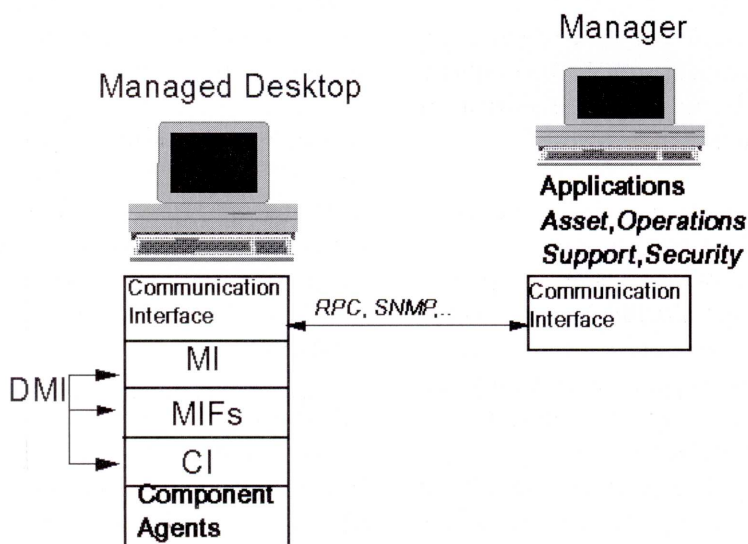
- Objects should be as common as possible to ensure their widespread use.
- Avoid management protocol dependent definitions.
- Avoid defining objects that impose burdens on critical sections of managed systems or require large amounts of storage.
- Remember the 80/20 rule: 20 percent of the information will be used 80 percent of the time.
- Avoid attributes that can easily be derived from other attributes.

DSIS Phase 1 Requirements contain these system objects (numbers in parenthesis are the number of attributes for that object.):

System (32)	General SW (14)
Disk (26)	File System (18)
Printer (11)	Processes (17)
Network Adapter (16)	Printer Spool Queue (11)
Processor (10)	
Tape (17)	
Display (9)	

IETF Host Resources MIB

Shortly after DSIS was formed, the IETF started a workgroup to define a new information standard for systems called the Host Resources MIB (HRM.) The HRM was the first MIB development within the IETF not specifically targeted at managing the network environment. The HRM working group is chartered to produce a document that defines MIB objects common to all Internet hosts, including UNIX- and DOS-based machines. DSIS has shared

FIGURE 3 *DMTF and Desktop Management*

early versions of its requirements specifications with the IETF. The HRM will likely be a subset of the DSIS requirements when it becomes an approved standard in 1994. The HRM contains most of the DSIS objects but there are generally fewer attributes per object.

At least one major vendor has announced a product that supports the HRM.

Desktop Management Task Force (DMTF)

This consortium was formed to promote a unifying management API called the Desktop Management Interface (DMI). By uniting all desktop components under standard APIs, desktop component vendors need support only a single interface for managing their devices. Likewise, management application vendors will have only one interface for managing components from different vendors.

In addition to APIs, the DMTF includes a specification describing how information about a component is stored in a file called a MIF (Management Information File). MIFs are ASCII files containing information about components such as disks, operating systems, boards, and application software. MIFs provide a consistent way to store comprehensive information about desktop components. The types of components and information about them are similar to the kinds of information found in the Host Resources MIB and DSIS. In fact these three groups are working together to reduce overlap and support a common information set.

The DMI is really two different interfaces. The CI (Component Interface) is used by component agents to access the MIF (i.e., store information). The other interface is the MI (Management

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Interface). Management applications access the MIF with the Management Interface (MI). Communication interfaces are not specified by the DMTF and could be SNMP, RPC, or other protocols. *Figure 3* illustrates the DMTF components.

The DMI does not provide management functionality itself. This would be provided by the application vendors in such areas as:

1. Asset Management that includes HW and SW inventory tracking.
2. Operations Management for performance optimization, backup, configuration control, and resource usage.
3. Technical Support focusing on proactive monitoring, error reporting, and problem isolation.
4. Security Management for identifying and preventing unauthorized access to system resources, virus detection, data backup, and disaster recovery.

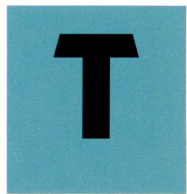
Conclusion

Those "lonely, unmanageable PCs" will soon be moving into the mainstream of computing support by vendor adoption of desktop management standards.

Management standards will be necessary as desktop support and management become centralized company activities. Without management information standards, these support groups cannot be successful as computing becomes more distributed. Using lessons and technologies from centralized network management, several vendor and user groups have been formed to lay the foundation for desktop management standards. ■

Bill Bowman is a senior engineer at Hewlett-Packard's Multivendor Services Division and is HP's representative to the DSIS Consortium. He is involved in developing solutions for remote multivendor problem isolation and repair.

Career Resources for Computing Professionals



The March 1994 issue of *Money Magazine* nominated Computer Systems Analyst to be the best job in America. It cited the Bureau of Labor Statistics as forecasting a phenomenal 110 percent job growth over the next 11 years, as well as excellent job security, prestige, and decent pay.

Despite the rosy forecast, there will still be plenty of colleagues searching for new jobs as the wave of downsizing continues. This article covers some of the resources available for the computer professional's job search, such as online services, salary surveys, and career guides. Most of the online services require access to the Internet, but some can be accessed using just a modem and a PC. All the listed online services are free for the job searcher.

The Internet

The information highway is up and running, but not everyone is connected to it. If your company does not have an Internet connection, you can purchase your own access through a commercial provider. *Figure 1* lists several of the larger providers; some may provide access through a local phone number. Several small local access companies are sprouting up across the country, often providing no-frills access at a big discount compared with the larger services. Some cities also have "freenets" sponsored by area businesses that provide limited access to area citizens free of charge. Ask at your local library or community service center.

Newsgroups

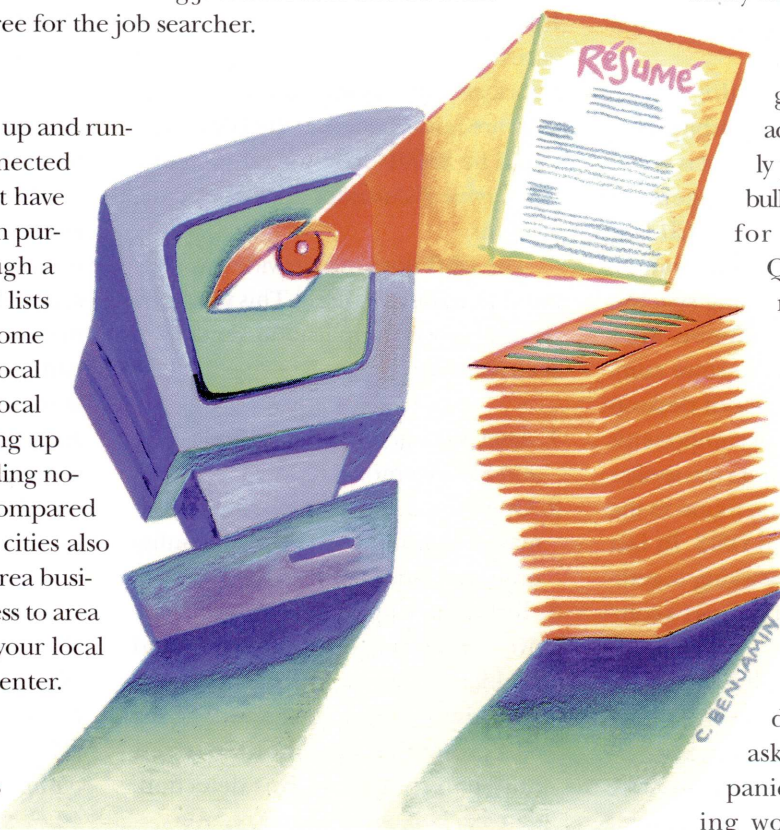
The Usenet newsgroups are online bulletin boards,

distributed among thousands of computers all over the world. The messages are transported using the Internet and other networks, or by downloading over a phone line (usually using the UNIX UUCP protocol). One company even offers a newsfeed via satellite.

A good place to start looking around is the *misc.jobs.misc* newsgroup. It discusses many topics related to working,

mostly in the computer field. It is a widely read group on the Internet, according to the periodically posted FAQ information bulletin (FAQ is network lingo for Frequently Asked Questions). Even if you are not currently looking for a new job, it may be beneficial to keep informed about what goes on in the job market.

College students get information on what it is like to work in "real world" matters such as expected over time and the skills that are currently desirable. Other people ask for tidbits about companies they are contemplating working for. There are



by Steen Hansen Hviid

discussions on gender roles, what to put on a résumé, and how to quit a job. Information pages are posted periodically, giving company policies on drug, psychological, and other medical tests and details of how they are performed. Another periodic posting lists the dress code for several large companies; so if you wish to find out if long hair and jeans are acceptable at Hewlett-Packard (they are), this is the place. Most of the listed companies are on the relaxed side, though many specify it varies with the manager.

Recently several people shared horror stories under the heading ("thread" in Net-lingo) of "Interviews from Hell." There was the story of the applicant who was subjected to a mass interview with several young hard-charging applicants in expensive suits. Among the things they were asked was what type of car they each would like to have, if money was not an issue. It did not quite fit in with the desires of the other applicants that our story teller was quite satisfied with his 20-year-old VW bug. In a similar story, we hear of another mass interview where the applicants were asked to sketch a new logo for the department. These stories then generated an interesting conversation on the newsgroup. Several other people had been subjected

to the same car question, or could share stories about how company cultures can dictate what the "right" type of vehicle should be. Some companies even have a policy against their employees driving bicycles or motorcycles to work while wearing the company uniform. One interviewee was asked if he preferred an automatic to a manual transmission on his car. The reason seemed to be that persons who preferred manual transmissions are also the type who would like to be more involved in their work.

Another story was the sad tale of what can happen when the logistics for an out-of-town interview fails. First the plane is delayed and then the hotel and transfer go askew, so the applicant gets very little sleep the night before the interview. The next morning the interviewer remarks on the applicant's seeming lack of enthusiasm.



Illustrations by Christine Benjamin



New trends in hiring are also debated, such as the automated scanning of résumés many large companies now use. These companies save personnel by using a computer to scan and interpret the high volume of incoming résumés. The advice generated by this discussion is to avoid fancy fonts (monospaced Courier is a safe choice), make sure the print is crisp (no matrix printing), and include as much alphabet soup as possible to increase the chance of a match.

This newsgroup receives many entries from people peddling "MAKE.MONEY.FAST" schemes, usually some sort of pyramid scheme or other setup requiring you to purchase a product. Read the periodic postings revealing how these schemes work; some of them are illegal and have been prosecuted by the Postmaster General and the FBI.

The *misc.jobs.offered*, *misc.jobs.offered.entry*, and *misc.jobs.resumes* newsgroups are devoted to posting job offers and résumés. The volume in these groups is very high; reading them with a regular newsreader would take too long. Instead, use a newsreader that allows you to scan the subject lines, such as the UNIX *trn* reader. Even better is to search on the postings using e-mail's service, which will be covered later in this article. Though it is possible to reply by e-mail to these postings, most companies prefer to receive replies by letter. If you send an e-mail reply, your letter may drown in the large number of replies. Some network users, especially newly graduated students, reply to any job regardless of whether they meet the requirements or not.

There are several local newsgroups posting jobs for a specific city or region. The *ba.jobs.offered* group list jobs in the San Francisco Bay Area; *fl.jobs* covers all of Florida, while *cmh.jobs* covers only the city of Columbus, Ohio. Check which groups are available on your host. Some newsreaders allow you to search by group name, e.g., the `"/jobs"` command on some UNIX readers.

The Internet Gopher

Gopher is a client-server program developed by a small group at the University of Minnesota. In a matter of a few years it has seen widespread use on the Internet because of its user-friendly interface and simplicity in administration. It allows a user to navigate computer systems on the Internet using simple menus. The user is unaware when the Gopher jumps from

machine to machine, since it is handled transparently. It is available free of charge for a range of platforms, but requires that your machine be connected to the Internet.

Gopher consists of two parts: a server program used by the information providers, and a client program used by the end user to navigate among the large number of servers. Unless you wish to become your own information provider, you need only the client program. The client software is available for most platforms, including DOS, Windows, OS/2, Macintosh, SunOS, and NeXTstep. There is also a generic UNIX version to be used by character terminals. The programs are available by anonymous ftp from *boombox.micro.umn.edu*. They are easy to install if you already have an Internet connection and are familiar with the "make" utility (for the UNIX versions). Technical details are covered by the *comp.infosystems.gopher* newsgroup.

The Gopher client program will, by default, access the grandfather of all Gopher servers at the University of Minnesota (*gopher.micro.umn.edu*). You can direct it to contact any Gopher server by simply supplying it with the Internet address, and sometimes also a port number. The default port number of 70 is used by most Gopher servers.

If you find some information you wish to keep, you can instruct the Gopher client to save it to a file, e-mail it to you, or print it. Which of these options is available to you depends on the implementation, but at least one of them should be possible."

Gopher access is also provided by some commercial online service providers, including America Online,

New HP-UX Software Library Edition Released by Interex

The 1994 HP-UX Contributed Software Library (CSL) will be available on June 1. The new release contains utilities and applications created by experienced users to target the specific challenges facing HP-UX installations. The release contains 48 programs, some of which come directly from Hewlett-Packard Labs. This year's release is one of the most extensive software library collections available today configured specifically for users of HP-UX.

According to Paul Gerwitz, CSL/HP-UX Committee Chairman:

"We have attempted to anticipate our members' needs through some of the contributions in this year's release, while providing new functionality, especially in integrating to non-HP-UX environments. We are grateful to the many Interex members and other interested organizations whose hard work contributed to this release."

Many exceptional systems administration programs were also contributed. These include:

- 'top'
- 'psort'
- 'traceroute'
- 'sudo'
- current versions of 'perl' and 'imake'

New utilities include:

- the Free Software Foundation's C compiler 'gcc' and libraries
- a movie viewer to display sequenced graphics

All submissions are evaluated by the CSL/HP-UX Quality Assurance Team for technical quality and accuracy, ensuring that the CSL release contains only the highest caliber programs.

This edition of the library is available in preferred software formats: 1600 or 6250 bpi magnetic tape, Linus cartridge tape (CS-80), Digital Audio Tape 4mm (DAT), and magneto-optical disk, which allows users to store large amounts of software online.

HP-UX users who subscribe to CSL Site-level membership in Interex pay an annual fee of \$495 and automatically receive the annual HP-UX CSL release in addition to conference discounts, HP-UX-specific publications, access to Special Interest Groups (SIGs), and the benefits of an extensive advocacy program. An index of the entire HP-UX CSL Library is available from the Member Services Department. Phone 800.INTEREX, fax us at 408.747.0947, or send an e-mail message to csl@interex.org.

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FIGURE 1 *Internet Access providers*

America Online	800-827-6364
BIX	617-491-3393
Delphi	800-695-4005
Msen	313-998-4562
PSI World-Dial	800-827-7482
UUNet	800-488-6384
Internic	800-444-4345

Internic is an Internet information service that has lists of local access providers.

Some other major online providers, such as CompuServe, offer only e-mail gateways to the Internet, but are working on adding more services.

FIGURE 2 *Gopher access*

Online Career Center
garnet.msen.com (port 9062)
 Chronicle of Higher Education
chronicle.merit.edu
 Access to 100+ Gopher servers with job postings
rice-info.rice.edu
 select: "Information by Subject"
 select: "Jobs and Employment"
 Access to 30+ Gopher servers with job postings
gopher.mountain.net
 select: "Employment Opportunities"
 Federal job postings
dartcms1.dartmouth.edu

Delphi, and BIX. Other providers, such as CompuServe, are rumored to be working on expanding their Internet services.

Information Available on Gopher

There are many Gopher servers with job listings. Most of them are maintained by a large organization, usually a university. I could not locate any Gopher server with jobs for large computer companies, such as Hewlett-Packard (I am told Hewlett-Packard does not have any central job postings).

A few servers provide jobs from multiple sources. *Figure 2*

shows a short list of Gophers with many jobs listed. The Gopher at Rice University provides access to more than 100 other Gopher servers with job listings, almost exclusively with other universities.

Most organizational Gopher servers store a wealth of information, such as phone directories and schedules. It can be hard to find where a particular piece of information is stored, so many of them are equipped with a search capability. Take advantage of this facility to bring you directly to where you want to go. Search options are often marked with a question mark on the menu and sometimes also referred to by the name of the search program, such as "Jughead" or "WAIS." A "WAIS" search may also cover Gopher servers at other sites, while the "Veronica" search tool is exclusively for searching for information across the entire Net. Avoid using these wide-area search facilities unless necessary, since they are often heavily used.

Once you have found a menu with information you wish to access again later, you may want to find out which machine it is really stored on. That way you can save time going directly to it, instead of going through several menus. Not all Gopher clients can display the "path"; check your documentation. On the generic UNIX version, the path is displayed by pressing the "=" key. Some Gopher clients allow you to store a list of your favorite servers, so you can access them as a menu option instead of typing in the address each time. This facility is called "bookmarks" in Gopher parlance.

The Gopher system is still growing rapidly across the globe, with the traffic currently increasing by more than 10 percent per month. New services are appearing all the time and others change or disappear.

Online Career Center

The Online Career Center is based in Indianapolis; its data servers are maintained by a service provider in Michigan. It can be accessed through the Internet by telnet, Gopher, and World Wide Web (WWW). To get more information, send an empty e-mail message to *occ-info@msen.com*.

All jobs and résumés posted on the *misc.jobs.offered* and *misc.jobs.resumes* newsgroups are stored on the system together with jobs from regional job newsgroups. There are also direct postings from several member companies. The number of jobs on this system is literally thousands. A recent search for all jobs mentioning the word "HP-UX" returned 92 advertised positions. Searching on "HP 3000" and "MPE" returned 22 positions.

This database can be searched by region, but the Online

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FIGURE 3 Internet telnet access

Online Career Center
 telnet: *gopher.msu.edu*
 select: "Network & Database Resources"
 select: "Internet Resources by type"
 select: "Gopher servers"
 select: "Keyword search of Gopher site names"
 enter: "Career"

CapAccess:
 telnet: *cap.gwu.edu*
 login: guest
 passwd: visitor
 enter: go careers

HEART:
 telnet: *career.com*

FedWorld
 telnet: *fedworld.gov*
 enter: /go jobs (at main menu)

Career Center uses an automated system to classify the jobs by region, which is not always accurate. You can also search on one or more words. If you wish to search for jobs in San Diego, you need to enter the search string as "san and diego." If you entered the search string as "san diego", it would return all matches on either "san" or "diego" and you would get postings for "San Francisco" and "San Jose."

This service is very popular and has been troubled by overloading. The organization recently upgraded its system and it is currently always accessible.

You can enter your résumé electronically, where it can be searched by employers. This service is also free. If you do not have network access, you can mail a printed copy to the company. For a fee of \$10, it will type in a maximum of three pages and keep it in the database for six months. Send your résumé, and a \$10 check, to:

ONLINE RESUME SERVICE
 1713 Hemlock Lane
 Plainfield, IN 46168

Chronicle of Higher Education

The jobs advertised in the Chronicle of Higher Education are all available for searches on a dedicated Gopher server. The jobs are mostly faculty and research positions, but there are also some administrative and staff jobs. It lists a few jobs outside academia.

Services available by telnet

A few notable services are available for logins using the *telnet* command. *Figure 3* lists the addresses and helpful information.

CapAccess (National Capital Area Public Access Network, Inc.) is a nonprofit community service for the Washington, D.C. area. The service is provided with support from George Washington University and the Corporation for Public Broadcasting. It contains a great deal of information for the D.C. area, including various discussion groups. There is also a career section listing government jobs of all kinds, mostly for the D.C. area. The listings are for several federal agencies, the National Institutes of Health, and the National Science Foundation. The menus also offer a front end for e-mail, if you do not otherwise have access to a Gopher client program.

Fedworld also offers a range of information services, though it is hard to find the job listings using the menus (the "/go jobs" command will get you there directly). Jobs are listed by region, including positions at overseas installations. The ability to search the jobs by keyword is limited. It will prompt you for personal information the first time you log in and create an account for you.

HEART (Human resources Electronic Advertising & Recruiting Tool) is a user-friendly job bank, accessible by modem or the Internet. If your communications program can handle it, the screens are nice and colorful. The first time you log in, it asks you for your name, address, and educational level. You can search through their job postings by company name, job category, or geographical area. You can generate your résumé on the system, using their screens, or upload your own. If a job has your interest, it is a simple keystroke to send your résumé to the prospective employer. Your stored résumé is not scanned by employers unless you specify so.

You can list information about upcoming career expos organized by the Westech company, and browse through a public bulletin board and articles from *High Technology Careers Magazine*.

The job postings on HEART are limited to member companies. This service is new and currently (May 1994) has only sixteen member companies with locations in eight

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725	720	CRX-24Z	425 S	GRX	380	345	320
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states (mostly in the Southwest, Texas, and the Northeast). Companies on their list include Rolm, National Semiconductors, Network General, and NEC.

Dial-up Bulletin Boards

There are some services accessible by modem, though they seem not to have as many jobs listed, often less than one hundred. If you have access to a Gopher program, start with those services first. *Figure 4* lists a few dialup services with jobs listed for most regions of the country. They are all private, but charge no fees.

Internet Resources for Consultants

Are you harboring the idea of becoming an independent computer consultant, or have you already become one? There are also resources available specifically for computer consultants.

The *misc.jobs.contract* is a newsgroup for discussing contract work and posting jobs and résumés. Traffic is increasing rapidly, and the administrators are working on splitting the traffic into separate groups for posting contract work and résumés. The *alt.computer.consultant* group is an alternative discussion group for issues facing independent consultants, such as billing methods, etc.

Computer Consultants Information Machine

This server is maintained by the Personal Development Network, Inc. of Encino, California. You can send e-mail requests to its automated information server, which can send you copies of files stored on it. It stores a "Computer Consulting Business Factletter," which talks about what happens in the consulting business sprinkled with advice and anecdotes. The newsletter also lists the "Lucrative Programmer Skills" survey, which is sometimes also posted on the *misc.jobs.misc* newsgroup. The top desirable skills are usually AS/400, COBOL, DB2, UNIX, and C/C++, according to this survey.

To get information about this free service, send e-mail to server@pdnet.com with the words "HELP" and "QUIT" on separate lines in the message. To retrieve a sample newsletter, send the words "GET /pub/factletter.txt" and "QUIT" on separate lines to the same address.



Salary surveys

Salaries vary greatly by job title, experience, and region of the country. A survey of current salaries is a good tool to assess what salary to ask for. Source EDP is a company that exclusively recruits computer people. They publish a detailed annual survey with salaries listed for forty-five job titles in fifty cities in North

America. They will send this survey free of charge and will not hassle you. Simply send a postcard to their main office, asking for their free salary survey, or call the local office in your area. Their address is:

Source EDP
P.O. Box 152109
Irving TX 75015-9831.

Datamation is a free computer magazine with a broad mix of articles, including a detailed annual salary survey. The magazine also offers a free mail-in résumé bank. Subscriptions are free to qualified professionals. To get a subscription, you must fill out a Subscription Qualification form, which is included with each issue. If you cannot find a sample magazine, contact them at:

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- PACKING LIST:** Includes fields for Ship To, Bill To, and a table for items with columns for Description, Quantity, and Unit Price.
- Purchase Order:** Contains fields for Vendor, Customer, and a table for items with columns for Description, Quantity, Unit Price, and Extension. It also includes a section for delivery dates and a note about early shipments.
- SALES ORDER:** Includes fields for Customer, Vendor, and a table for items with columns for Description, Quantity, Unit Price, and Extension. It also includes a section for delivery dates and a note about early shipments.

StarJet is an electronic forms package for HP3000 (MPE, MPE/XL, MPE/IX), HP9000 (HP-UX), RS6000 (AIX) and DEC VAX (VMS ULTRIX OSF1) systems. StarJet provides an open systems environment where forms are fully transportable between systems* and can be executed on either system without any changes. StarJet electronic forms are easily integrated into your existing applications.

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FIGURE 4 *Dial-up electronic bulletin boards*

Allen Davis	(413) 549-8136
Computerworld	(508) 879-4700
Elec. Business Board	(805) 898-2593
HEART	(415) 917-2125 up to 14,400 BPS (415) 917-2129 up to 2,400 BPS

FIGURE 5 *Career guides for Computer Professionals*

The Computer Professional's Survival Guide.

Alan R. Simon, McGraw-Hill, Inc. New York, NY, 1992.

The Programmers Survival Guide—Career Strategies for Computer Professionals.

Janet Ruhl, Yourdon Press Computing Series, Englewood Cliffs, NJ, 1989.

How To Be A Successful Computer Consultant.

Alan R. Simon, McGraw-Hill, Inc. New York, NY, 1994.

CCP—The professional certification

Other professions have their certifications, such as CPA (Certified Public Accountant), CFP (Certified Financial Planner), and CLU (Chartered Life Underwriter). There is one for the computing profession called Certified Computing Professional (CCP). The organization issuing the certificates is not widely known, though it has existed since 1973 and certified 49,000 professionals. It has now started promoting its certification more aggressively and has computerized the testing procedure. It could be a good addition to a résumé, particularly if you intend to become a consultant. The certification is obtained by completing a combination of a core exam and two chosen specialty exams. All three exams can be taken in one day or one at a time. For more information, contact:

Institute for Certification of
Computing Professionals
2200 E. Devon Avenue, suite 268
Des Plaines, IL 60018-4503
(708) 299-4227

Career Books for Computer Professionals

There are a variety of books available on job searches and résumé writing, but only a few focus on the careers of computing professionals (see *Figure 5*). These books do not provide much help on writing a résumé, but can help you plan career moves and evaluate options. For a good general job-hunting guide, consider *What Color is Your Parachute?*, now in its fourteenth annual edition.

The Computer Professionals Survival Guide, by Alan Simon, is mostly aimed at people who already have some work experience and want to take more control of their career. It describes 19 different career paths, covering a broad range of computer jobs. It lists what skills and education are necessary for each type of position and provides advice on how to become successful. Simon also attempts to forecast the outlook for each type of position in the next decade.

A chapter is devoted to describing the different types of corporate culture, though that subject has more coverage in *The Programmers Survival Guide*.

The book provides an introduction to the different types of formal computer education and has suggestions on how to stay current after entering the workforce through continuing education, magazines, seminars, and conferences.

There is some helpful information on brushing up your résumé and interviewing technique, though you may need a book specifically on this subject.

The Programmers Survival Guide is three years older (1989), and it shows. It was written before downsizing became widespread and delves mostly into working on larger mainframe computer installations, not distributed network systems. The author worked for several large companies in different parts of the country, until she became an independent consultant. Her book describes mostly what you can expect when working for larger corporations, such as banks and insurance companies, and gives advice on how to plan your career. College graduates can get a reality check here if they expect to go out and design fancy systems. It also provides them with suggestions how the first ten years out of college should be used to grow professionally. It shows how to interpret job ads and suggests questions to ask at the job interview to avoid dead-end jobs and unpleasant work conditions.

This book also covers the typical types of jobs available, how to grow inside a corporation, and what pitfalls to avoid. A section of the book covers the rewards and risks of being an independent consultant.

The book is easy to read, even for people who have little experience with larger computer systems, and has many amusing anecdotes. If you intend to venture into the world of mainframes, this book provides valuable reading.

In its third edition, *How to Be a Successful Computer Consultant* is written in the same straightforward language as the author's other book, *The Computer Professional's Survival Guide*. The author first lists the many qualities necessary to make a successful consultant. This makes you take a realistic look at doing it on your own. You are then brought through the process of choosing the type of consultancy, planning and marketing the business, and making the necessary legal and financial arrangements. The author then delves into more details on actually running the business, such as bookkeeping and employing help. There is also advice on managing the development of a software product, conducting seminars, and doing technical writing. Throughout the book he stresses the importance of continuing self-education, since your success relies on it. ■

Steen Hansen Hviid is a computer specialist at the Ohio State University in Columbus, Ohio. He holds a Masters degree in Computer Engineering from the Technical University of Denmark and is a Certified Computing Professional.

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HP-UX Systems Administration

by Chris Curtin

SAM-HP's System Administration Manager

AS YOU KNOW, Hewlett-Packard's HP-UX operating system is very complex to administer. Note I did not say hard to administer. Luckily HP provides a tool called SAM to help you configure and manage your system. SAM, which stands for System Administration Manager, is a menu-driven tool for configuring and managing a system. It requires very little knowledge of HP-UX or UNIX.

Several readers of this column have noted that I do not use SAM in the configuration examples I provide. The reason is that I like to know what files are associated with a subsystem, how they interact, and the syntax used in configuring them. That is not to say that I do not use SAM at all; I would not think of managing a system with Logical Volumes without it.

SAM requires you be logged in as root. It often has problems if you *su* to root and run it, so always start from a fresh login. If you are using the X window version, *rlogin* to the local host with

```
rlogin name -l root
```

so you can have your usual environment and still run SAM as root. There are two versions of SAM: a character-based and an X Window/Motif version. Both are started with: */usr/bin/sam*. By default the character version is started. If you set your DISPLAY environment variable to your X terminal or workstation the Motif version is started.

The Motif version supports the mouse and double-clicking on an item to accept it; the character version uses function keys, tab keys, and the Return key for navigation. The character version also uses single-character shortcuts with the Alt key. For example, Alt-O opens

the highlighted action. (Unfortunately you must use F2 for the Alt key instead of the Alt key on your keyboard.)

The main menu for SAM shows the following areas to be configured and managed:

- Printers and Plotters
- Disks and File Systems
- Peripheral Devices
- Backup and Recovery
- Users and Groups
- Routine Tasks
- Process Management
- Kernel Configuration
- Networking/Communications
- Remote Administration
- Auditing and Security
- Other Utilities

Without getting into the gory details of every menu under every area, I'll describe what each area addresses.

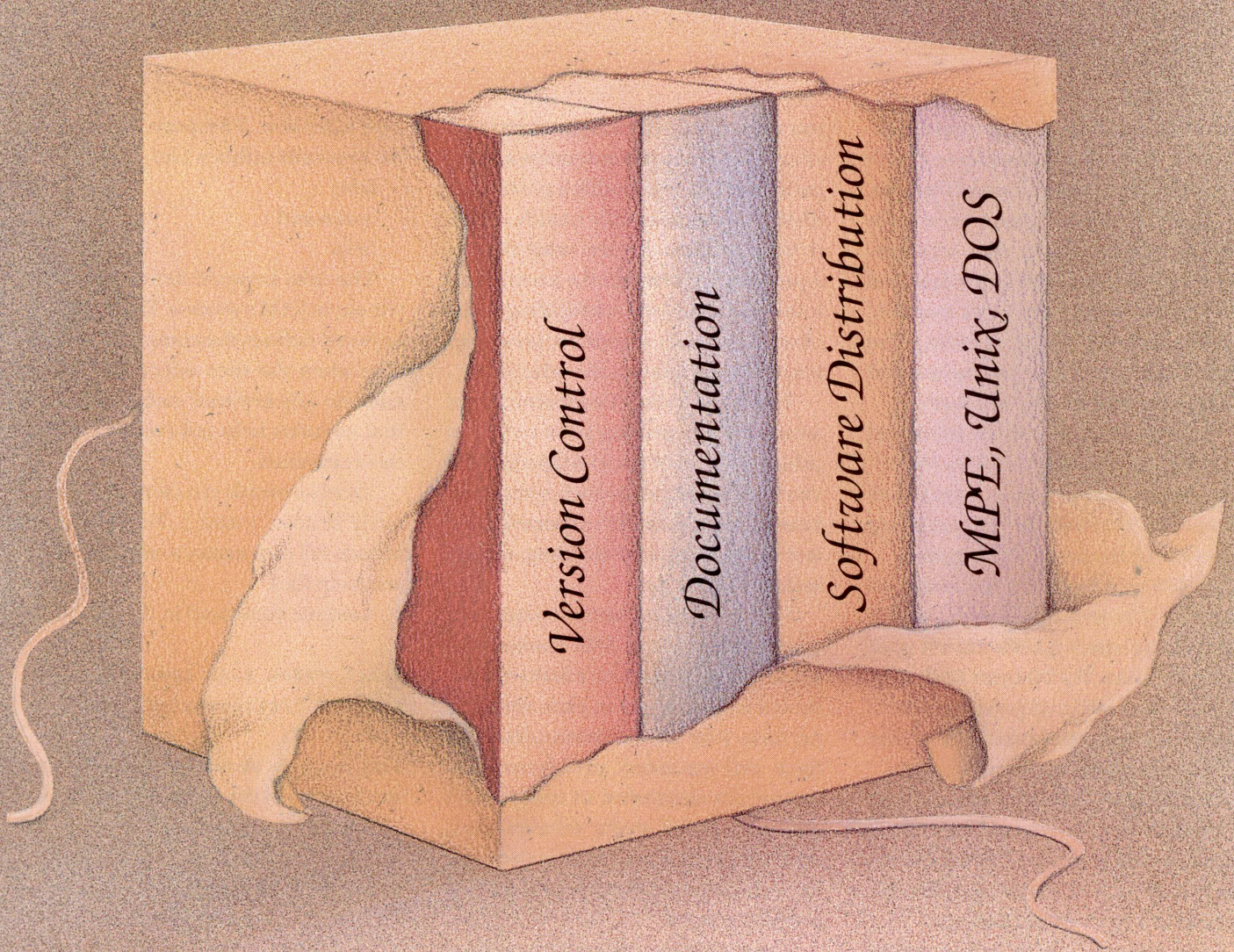
The Printers and Plotters area is for configuring the LP spooler, adding and deleting printers, and viewing the status of the spooler.

The Disks and File Systems area is for managing physical disks and file systems that you have created on the system. Levels below this walk you through adding new disks and configuring NFS, Logical Volumes, and swap space. I would not attempt to add a new disk drive or configure LVM without it.

The Peripheral Devices area is for managing hardware on your system. The second-tier menu has a link to the Printers and Plotters area and the Disks and File Systems area. From this area you can configure new cards installed in your system, Tape drives, terminals and modems and—starting with HP-UX 9.04—UPSs.

The Backup and Recovery area provides an interface to *fbackup/frestore*

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and walks you through setting up a backup plan. I do not use fbackup so I can't comment on the usefulness of this area.

The Users and Groups area is for adding and modifying user accounts. Adding users is a simple process and SAM performs the directory creation, file copying, and group updating. You can also change user passwords and enable and disable user accounts.

Routine Tasks has three sub-areas: Backup and Recovery (same as above), Disk Space Recovery, and System Shutdown. The System Shutdown area is used to reboot or halt your HP-UX system.

Disk Space Recovery is an interesting area. This area allows you to search for files that match specific criteria (such as larger than 25,000 bytes and more than 90 days old) and generate a list of these files. You can also look for all core files in the system and trim log files.

The Process Management area provides a nice interface for configuring crontab files that defines what the fields are and uses names such as "Always" and "Sunday" instead of wild cards and numbers.

The Process Control option under Process Management lists all processes running on your system and allows you to kill a process or change its priority.

The Performance Monitors option under Process Management gives you two options: run Top or run SAR. *top* and *sar* are utilities supplied with HP-UX that are used to check system performance. *top* lists the executing processes by CPU usage and *sar* lists data about CPU usage for the entire system. *top* and *sar* also can be run from the command line as stand-alone programs.

The Kernel Configuration area is for adding kernel drivers to your system and modifying kernel parameters. When modifying Kernel parameters, SAM gives

you a description of each parameter and checks for interdependencies among parameters. If you modify a parameter, SAM may automatically modify others or warn you that the new value violates a parameter rule within the kernel. This is very helpful when configuring semaphores since each semaphore parameter is somehow related to the others.

The Networking/Communications area is for connecting your system to others. It is used for configuring the */etc/hosts* file, defining which systems can have access to your NFS exported disks, and for enabling and disabling services such as *bootp* or *ftp*.

The Remote Administration area allows you to execute SAM functions on another system. It is a nice feature if you do not want to log in to each system to perform your administration duties. I have encountered problems with remote administration of systems with different HP-UX major releases when commands are not where they are expected or not even provided in a previous release.

The Auditing and Security area allows you to configure User, Event, and System auditing. I do not use this feature so I cannot comment on how SAM configures or manages it.

The Other Utilities area is a user-customizable area. You can add your own functions to SAM for this area, and HP uses it to add administration tools for optional products. In my case the configuration programs for the X terminals we use are installed here.

Adding Commands to the Other Utilities Area

Adding commands to the Other Utilities section is very easy. As root create a file in */usr/sam/custom* with a

.*ou* extension. There are three possible keywords within a file:

```
label
command
help
```

The *label* keyword defines the text you see in SAM's window. The *command* keyword defines the command to execute when the user selects the label, and the *help* keyword defines the file that contains help information about this command.

Label keywords can be nested using curly braces: { and }. Note: Always include full path names to all commands and help files.

A simple command in the file *cl.ou*:

```
label "Show swap space"
command "/etc/swapinfo"
```

This example shows the current swap space usage in the SAM window.

A larger example:

```
label "System Info"
{
    label "Show swap space"
    command "/etc/swapinfo"
    label "Show my processes"
    command "/bin/ps"
}
```

This example adds a new level of menus and adds a new command that shows the processes being run by a user.

You will need to restart SAM after each modification so it can reread the files.

Recovering Disk Space

As I mentioned above, SAM has the ability to monitor and trim log files on demand. By default, SAM has about 10 ASCII log files it monitors and trims on demand. You can add your own to this list.

Under the Routine Tasks → Disk Space

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CIRCLE 40 ON READER SERVICE CARD

Recovery → Log File Trimming → ASCII Log Files menu you have the option of adding your own files. Using the mouse or F2 function key, go to the Actions menu. One of the options is *Add to List...* Select this option and you will be presented with a dialogue box asking for the file name and the Recommended Size.

I added `/usr/spool/mqueue/syslog` with a Recommended Size of 50,000 bytes. This is the file created by *sendmail* and logs all the mail sent and received on your system. It grows quickly since every piece of mail sent by a user or received from another system is recorded in this file. (Only the sender and destination, not the contents.)

Now, every couple of days I look at this screen and trim any files that are larger than I want.

So What Did SAM Do?

As I said, I like to know what has happened on my system. I want to know so I understand my system and so I have some idea where a problem might be later. Earlier releases of SAM did not have a log file but starting with HP-UX 9.0 you can create log files of all SAM commands with a user-defined detail level.

There are four levels of logging: None, Summary, Detail, and Verbose. The None level does not perform any logging. The Summary level provides a minimal list, usually a written description of what you did. For example "Added file `/usr/spool/mqueue/syslog` to list of log files."

The Detail level provides you with the exact steps SAM performed as if you had typed them. This level is the most interesting from a "What did it do to my system?" point of view. This is the default level.

The Verbose level is overkill. It tells you what SAM is doing internally. It

reports what messages it is processing, which of its own subprograms it called to obtain information, and a lot of other stuff that you would only be interested in if you were responsible for supporting it!

The log file is located in `/usr/sam/log/samlog` and you can remove it at any time to save a copy of what SAM did for later review.

Using SAM: Pros and Cons

SAM is a very useful program that provides you with almost all the tools you need to do your system administration. Using the Other Utilities customization files you can add any tools you may need. SAM hides the complexities of managing an HP-UX system, but provides you with a detailed list of what it did if you want it. If you want or need a single tool for all your administration tasks, SAM will not disappoint you.

Some of the Cons are its size, speed, and complexity. It discourages its users from learning the specific commands that provide the same information as it does, but from a command line or within a script.

SAM is slow. It takes some time to start, and navigating through its menus takes time. All of the information screens, such as the LP spooler or process list, can be obtained faster and with more options if you use the command line programs associated with the subsystem (`lpstat -t` and `ps -ef` in this case).

SAM's character interface is annoying. In the Kernel Parameter Configuration screen a Page Up or Page Down shifts the display left or right instead of up or down. After changing a parameter, you are placed at the top of the list instead of at the parameter you changed.

SAM does operations by the book,

but not totally correctly. For example, add a new modem to your system and configure it for 19200 using SAM. Look at the `/usr/lib/uucp/Devices` file for the modem you added. It will have an entry for 19200, but not for 300,1200,2400, and 9600. If you try to add the modem again at 9600, SAM complains about the port already being in use. To get around this you must edit the file by hand.

In short, use SAM, but look at its log file and what modifications it has done to your system to make sure that they are what you intended and to understand what it did in case you need to fix something later.

World Wide Web Access To hpux-admin Mailing List

Last time I mentioned the *hpux-admin* mailing list that was created to replace the obsoleted *hpux-patch* mailing list. (Send e-mail to majordomo@cv.ruu.nl for information about the list.) The new list proved so popular that an archive site of all messages has been created. The archive site is available via World Wide Web at <http://www.cs.ruu.nl/hpux-admin-archive/>

Unfortunately, I do not have WWW access, so I cannot comment on the archive. If someone would like to send me some e-mail about the site, I'll include it in my next column.

Thanks for all the e-mail and suggestions for topics. I am always looking for ideas for this column and like to receive feedback from our readers. ■

Chris Curtin, a software developer for Bradley Ward Systems, Inc. in Atlanta, Georgia, specializes in device driver development for factory automation on the HP 9000. He can be reached via e-mail at: chris@bwilab3.atl.ga.us.

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CIRCLE 124 ON READER SERVICE CARD

by Larry Headlund

Programming Environments

I FIRST HEARD THE TERM “programming environment” used in the mid 1980s in reference to the Borland C programming environment for MS-DOS. What was meant by this was a suite of tools such as an editor, compiler, and debugger that all worked together and supported one another. Of course, MS-DOS was a particularly fertile field for sowing integrated environments because you could run only one program at a time. No escaping to the shell to run the compiler or a sort routine like a Real Operating System. In its extreme form this led to such kludges as database systems shipping with an integrated editor. If you wanted to do two or three or more tasks, the functionality for any task you wanted to do had to be included in the program. Contrast this with what is arguably the prime programmer’s operating system, UNIX. It was written by and for programmers using software engineering principles. It is this legacy that has made it so popular with programmers and perhaps so unpopular with the rest of the world.

Anyway, the programming environment concept spread well beyond Borland. Besides MS-DOS and later MS Windows competitors, there are several commercial programming environments available in the UNIX/X world. An example is HP’s SoftBench product. Another is the suite of products from CodeCenter. All of these try to make the programmer’s job easier by putting a friendly front end on compilers and debuggers and integrating them with the editor. Some of them with more ambitious goals have become part of the lowercase or uppercase CASE movement.

All these, of course, are commercial products. In the noncommercial world the premier example would be EMACS,

more of a way of life than an editor. EMACS’ devotees spend most of their days (and nights) inside of it. While EMACS is very extensible and available everywhere, it is at heart non-GUI and so a little outside the boundaries of this column. The editor xcoral, discussed in my last column, with its integrated browser and ability to launch shell commands in their own window, is well on the way to being a programming environment. But for those enamored of the Borland environment, there is now a UNIX/X (and free) alternative—xwpe.

Xwpe

Xwpe (XWindow Programming Environment) by Fred Kruse (kruse@rz-nis.uni-hannover.de) looks like a replacement for the Borland Integrated Development Environment. Xwpe is distributed under the GNU Public License. This means that if you distribute copies of xwpe or modifications of it, you must make the source available. You can use it on your own desktop with no restrictions.

Xwpe uses just the Xlib library (-lX11), not the Motif or Athena widget sets. It makes no attempt to emulate the look and feel of Motif programs. In fact, the screens look like nothing so much as MS-DOS programs run under an MS-DOS emulator such as SoftPC from Insignia. Not like MS-Windows, but like mouse-aware MS-DOS programs. This will be a comfort to experienced Borland users. It does clash on your desktop with Motif programs.

Xwpe consists of two programs for the X environment, xwpe and an integrated editor, xwe. The editor can be used independent of the environment. Xwpe does include character-only versions of the programming environment (wp) and the editor (we) that use the

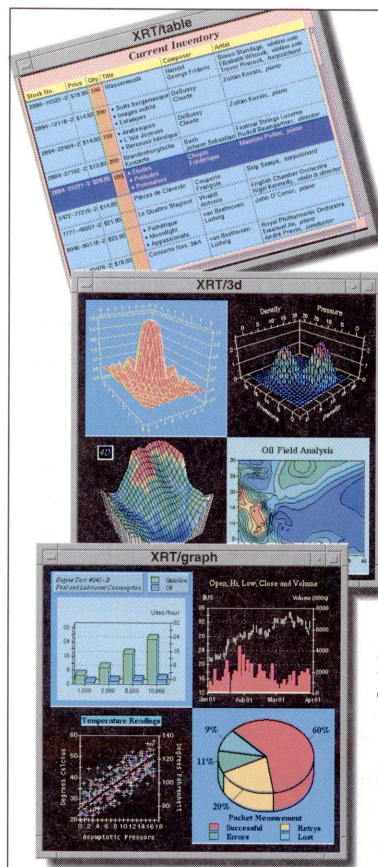
curses library. I found that these produce some interesting results on the hpterm client when term is defined to be hp. This is not surprising, since I have seen the same behavior with other applications that make, shall we say, aggressive use of the curses library. The misbehavior is limited to not refreshing the terminal screen properly. Everything works fine under xterm.

A lot of products are released under the GNU Public license or GPL. Some of these are tightly integrated with the whole GNU environment, expecting to find EMACS and depending on it for script processing, for example. Other products are completely independent of GNU. Xwpe falls somewhere in the middle. While it will compile under the GNU C compiler, gcc, it does not require it. It is written in K&R C, not ANSI C. It is described as working best with gcc, but it will work with any C compiler. It has support for the GNU debugger and sdb.

One thing I must mention. While all the menus and labels for xwpe are in English, all the documentation, and the comments in the code, are in German. If you are not familiar with the language of Goethe and Gauss, this may put you off. However, the functionality is so straightforward that I think any bold spirit will be able to use xwpe. After all, how often do we read the documentation anyway? Anyone who has used the DOS environments would be comfortable.

Xwpe Features

So, what do you get besides an editor? Since this is a C/UNIX oriented environment, you can execute shell commands. These will be executed in their own window (an instance of xterm). The dialogue for executing shells lets you choose the command from one in the current directory or use mouse commands to change directories. Commonly used UNIX commands such as *grep* and *find* have their own menu button which pops up a dialogue for entering options. It includes a wastebasket utility for recovering deleted files.



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CIRCLE 166 ON READER SERVICE CARD

As a programming environment, xwpe is integrated with programming tools. *Make* will probably be the most commonly used. When executing *make* under xwpe's control, you can step through the errors from a compile in the source file that generated those errors, correcting as you go. You can also run the C or C++ compiler independent of *make*. There are dialogues that allow you to set your options to these commands. Xwpe has a front end to the debugger (gdb, the GNU debugger for gcc recommended) which lets you enter break points, print the stack, evaluate variables, etc., without remembering the cryptic commands.

Following its MS-DOS model, xwpe does not set its values naturally through resources, but does have an options menu for setting colors for every component. There is no font menu, however.

The editor itself is very straightforward. It uses the familiar mouse drag to select blocks of text, for example. The menus have the usual suspects for copying, deleting, searching, and replacing text.

Making Xwpe on HP-UX

I was able to make xwpe on an HP 425 running HP-UX

9.00 and an HP 712 running HP-UX 9.03, with only minor modifications.

First, before running *sh* configure, set the environment variable

```
LIBS="-L/usr/lib/X11R5"; Export LIBS
```

Otherwise, the configure script may be unable to find libX11 and conclude you don't have X available.

Second, add

```
-I/usr/include/X11R5
```

to the DEFS in the Makefile. Otherwise, *ccp* will not be able to find the X11/*.h files it needs.

Third, also in the Makefile, the line for LIBS should read

```
LIBS=-L/usr/lib/X11R5 -lX11
```

That's all for the 712.

A little more work is needed for the HP 425 using HP's compiler. In the file *we_wind.c* comment out the following lines beginning on line 1184 and through line 1187:

```
/* #elif !defined(NOANSI)
char rhm[2][6]; #endif */
```

Also on the HP 400, in the file *we_mouse.c*, change the lines beginning at line 563:

```
#elif defined(PROG) { if((e_we_sw & 2) && !
    strcmp(f->datnam, "Messages"))
    return(e_d_car_mouse(f)); else e_cur_mouse(f); }
#else
```

to read:

```
#else #ifdef (PROG) { if((e_we_sw & 2) && !
    strcmp(f->datnam, "Messages")) return(e_d_car_mouse(f));
else e_cur_mouse(f); } #endif #else
```

And that is all. Typing "make install" will make everything and put it in */usr/local/bin*.

Where to get Xwpe

Xwpe is available via anonymous ftp at:

sun.rz.tu-clausthal.de/pub/unix/lang/xwpe.tar.Z

It is currently at version 1.0.1.

Conclusion

I must confess that for all its intriguing features, xwpe has not become my programming environment. It is just a little too alien to my Motif environment. But if I had been using the Borland IDE or a similar one regularly, I think I would grab this one fast. ■

Larry Headlund is president of Eikonal Systems and has been working with commercial UNIX since 1982 and with X since 1988. He can be reached at (617) 482-3345 or lmh@world.std.com.

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CIRCLE 141 ON READER SERVICE CARD

by David L. Totsch

Warning: Ugly Shell Trick Ahead

WELL, WHAT I AM ABOUT TO SHOW YOU is not really all that ugly. It is not much of a trick either. I document it that way because manipulating file descriptors in a shell is not a common method for solving problems.

First, let's review file descriptors. When you open a file in UNIX, the kernel assigns it an integer for your session. By default, your shell opens the following file descriptors:

- 0 standard input (*stdin*)
- 1 standard output (*stdout*)
- 2 standard error (*stderr*)

This correlates with the same file descriptors (and names) that you deal with when you write C programs. The kernel gives you the ability to manipulate up to 10 file descriptors (0–9). You have probably become very adept at manipulating file descriptors one and two as in the following:

```
ls > keepfile           (put the listing in keepfile and send errors to
                        the terminal)
ls > keepfile 2>/dev/null (put the listing in keepfile and send errors to
                        the bit bucket—handy, but not always wise)
ls > keepfile 2>&1        (put the listing and the errors in keepfile)
```

Now that you know you can create new file descriptors, let's take a look at what you can do with the spares. Here is an example that will give you an idea or two:

```
##### Open a log file as file descriptor eight
exec 8>/tmp/logfile

##### Write some log stuff:
echo "PROGRAM STARTED AT: \c" >&8
date >&8
echo "PROGRAM ENDED AT: \c" >&8
date >&8

##### Close our log file
exec 8>&-
```

Here is the output:

```
PROGRAM STARTED AT: Tue Jan 4 18:23:17 EST 1994
PROGRAM ENDED AT: Tue Jan 4 18:23:17 EST 1994
```

There are two things to notice here. First, the file stays open (no close is issued). Second, you have to close your file. The shell will automatically write your file and close the file descriptor on exit, but you could close it early and then reopen for append (`exec 8>>/tmp/logfile`).

This solution does only one thing for you: it saves syntax. The equivalent syntax for the above example would be:

```
LOGFILE=/tmp/logfile
echo "PROGRAM STARTED AT: \c" >> $LOGFILE
```

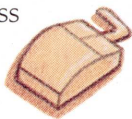

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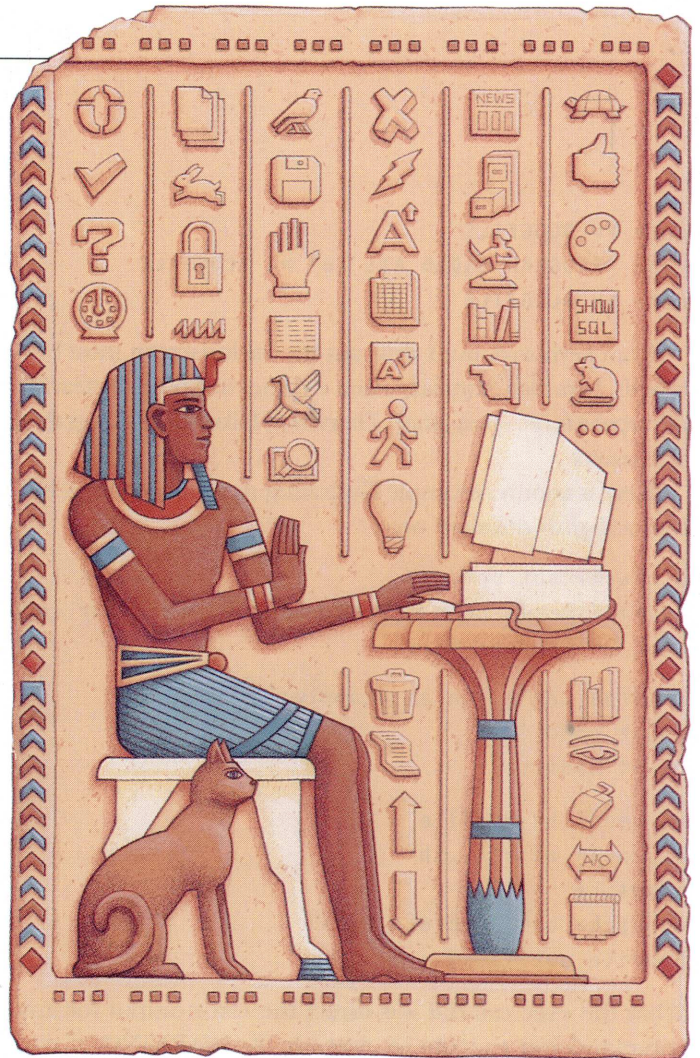


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```
date >> $LOGFILE
echo "PROGRAM ENDED AT: \c" >> $LOGFILE
date >> $LOGFILE
```

I can keyboard, but I wear out the backspace on most keyboards. I am also extra lazy when it comes to typing (or fearful of carpal-tunnel syndrome). Therefore, I like to see things that save syntax.

Here is another example illustrating the same concept, but with a slightly different twist:

```
dtotsch> cat ugly.sh
##### Setup file descriptor 9 as the error log
exec 2>/tmp/err_file

##### Let's run an example:
touch goodfile
rm -f badfile

ls goodfile badfile
dtotsch> sh ugly.sh
goodfile
dtotsch> cat /tmp/err_file
badfile not found
```

What the `exec` call did was direct the error output for any command you execute to `/tmp/err_file`. WARNING: if you close file descriptor two, you lose any further output going to `stderr`! You might want to do the following to dup the `stderr` so that you can restore it:

```
##### Save stderr in file descriptor two
exec 9>&2
##### Direct stderr to /tmp/err_file
exec 2>/tmp/err_file
.
.
.
##### Close /tmp/err_file
exec 2>&-
##### Restore stderr
exec 2>&9
```

As always, you are cautioned to be careful when using the concepts shown. This is definitely not territory where you develop your shell scripts as root. As a final example of what you might do with this "Ugly Shell Trick," here is something that manipulates file descriptor zero (`stdin`):

awk Article Correction

We received the following e-mail message from Aquilino Scanga:

I never find these types of things, so I thought I would pop off a short note to you to let you know that I found an extremely minor error in David L. Totsch's article on `awk` programming in the May 1994 issue. On page 16, second column, he states that "... '{print \$NR}' will print the last field of each record." According to his definitions (and my tests), this is incorrect. This will print the field value held in `NR`. Thus the first iteration of this command will print field position 1 record 1; second iteration, field 2 in record 2; third, field 3 in record 3, and so on. I believe he meant to say '{print \$NF}' will print the last field of each record, as `NF` counts the fields in each record.

Ack

Aquilino Scanga
Systems Engineer
Synapse Computer Services, Inc.

Thanks, Aquilino, for reading the article and taking the time to respond. Your response is appreciated.

Even after reviewing that material for inclusion in *hp-ux/usr* and presentation to user groups, I had never caught that blatant error (and in this day of electronic communications I couldn't blame it on the typesetter). But, you are correct; '{print \$NF}' is the correct syntax for printing the last field of each record. Good catch. Thank you.

David L. Totsch

```
exec 0<junk
echo "ENTER A FILE OR DIRECTORY: \c"
DIRECTORY=`line`
while [ -n "${DIRECTORY}" ]
do
    ls -ld $DIRECTORY
    echo "ENTER A FILE OR DIRECTORY: \c"
    DIRECTORY=`line`
done
```

David L. Totsch has worked in several different organizations over the past seven years as a system administrator with various flavors of UNIX. At present he is working with HP-UX systems and wide-area networks for a Fortune 100 company in the Piedmont area of North Carolina.

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by Bill Hassell

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Or, how about a pocket guide to CD-ROM titles? Pemberton Press now publishes a quarterly pocket guide to CD-ROM titles for Macintosh, DOS, 3DO, CD-I, and even Sega CDs. Listed with each title are the publisher's name, price, format/platform, requirements (display, MPC level, memory, etc.), plus a description of the CD. The guide is sorted by subject category. Newsstand price is \$5.95 or \$16.95 per year.

CD-ROM discs are now showing up as both rentable (from video stores typically) as well as lending titles from public libraries. One of the first libraries to do this is the City of York Library (Ontario, Canada), where more than 34 different titles are now available. Titles include: CD Game Pack, Bible Library, RBBS in a Box, MS Bookshelf, Atlas Pack, and many more. This program has been in place almost two years now.

The library has had to review the licensing carefully for each title to make sure copyright restrictions are not violated.

Many indices and directories on CD-ROM prohibit such distribution while general-interest titles are less restrictive. The most popular titles are Multimedia Beethoven, First Canadian Shareware, and Sherlock Holmes.

Several people have been asking about CD-ROM standards. Here is a glossary:

CD-DA was the first specification from Sony and Philips, and covered the Compact Disc Digital Audio format—the common audio disc we know today. This spec is called the *Red Book*.

CD-ROM was initially defined by the *Yellow Book*, a joint effort between Philips and Sony, more formally adopted as the ISO 9660 format. It essentially defines the method of recording files and directories on the disc but does not define the content of the files.

CD-ROM XA is defined as Compact Disc Read Only Memory, Extended Architecture and has become the bridge specification that allows a multitude of hosts to access common data for video and audio on the CD-ROM. The spec covers screen display details as well as output to laser printers and the handling of highly compressed audio.

CD-Rx is an emerging standard driven by the attempts of the intelligence community in Washington D.C. (is that an oxymoron?) to standardize on the format for data, something akin to a common database method. Another format is called **SFQL**, for Structured Full-Text Query Language, backed primarily by the Air Transport Association. Neither standard has been finalized or widely accepted as yet.

CD-I has been defined by the *Green Book*, also a joint effort between Philips and Sony, which specifies an interactive hardware/software product including the CD-ROM drive, 68000-based CPU, and special

audio and video hardware. It is primarily aimed at the interactive training and information retrieval market and cannot display full-screen, full-motion video. It is not compatible with any hardware that does not conform to the CD-I spec. CD-I employs data compression to make high-quality video images more compact.

DVI is a more generalized spec which only requires the DVI chip set to realize full-screen, full-motion video, displayable on a wide variety of equipment including (in theory anyway) X Window and Presentation Manager (OS/2). Further, it is not locked into the CD-ROM but can be used in a variety of sources including conventional hard disks, WORM (write-once, read-many) discs, and magneto-optical or read/write optical discs. DVI also uses data compression methods (part of the chip set) to make video images very small (reductions from 75 to 95 percent are possible). Other image compression standards are known as JPEG, MPEG, and Px64, but these are not unique to the CD-ROM industry.

DVI started at RCA as part of the then emerging LaserVision product line. RCA later dropped out of the LaserDisc business and the technology was acquired by GE. Despite a good showing at the 1987 CD-ROM Conference, GE finally sold the technology to Intel, the current supplier of the DVI chip set.

MSCDEX is the Microsoft Compact Disc Extensions specification, which applies to CD-ROMs running on DOS-based PCs. It is also known as a redirector since it essentially translates one method of data storage/retrieval into a DOS-compatible form. An example of another redirector is the LAN redirector used with OfficeShare and LanManager.

Photo CD has been proposed by Kodak for the storage of high-quality

photographic images. The proprietary format for image storage allows several different resolution sizes ranging from 192×128 bits to 3072×2048 bits. The format also defines professional images.

ISO 9660, sometimes with the extension **1988**, is the successor to the High Sierra standard, which more clearly defines many aspects of High Sierra while adding additional features for file characteristics. ISO is the International Standards Organization.

ECMA 168 is also known as Rock Ridge Interchange Protocol, System Use Sharing Protocol (SUSP), the Posix CD-ROM format, or even IEC DIS 13490. The standard defines changes to ISO 9660 that allow UNIX-like permission settings and longer path/filenames.

Standards by color name:

Red Book: CD-DA or audio format

Yellow Book: CD-ROM, the basic CD Read Only Memory format

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Green Book: CD-I or CD-Interactive format

Orange Book: WORM (Write Once Read Many) format

These standards were named for the color of the binder used to distribute the documents.

This will be the last CD-ROM column. CD-ROM technology has advanced from experimental to leading-edge and now is fairly stable and widely available. As with the PC, there are many, many choices in equipment as well as titles and it's difficult to filter out the more generic information that would be of general interest. I'll be placing CD-ROM information into the Q and A column as it shows up. Thanks for your interest. ■

Bill Hassell is an HP-UX system support engineer at the HP Atlanta Response Center. He can be contacted via e-mail at blh@hpuerca.atl.hp.com.



CSL/HP-UX

WELCOME TO INTEREX! Many of you are reading this column for the first time; some of you may have picked up a copy at the Denver conference or maybe you're looking forward to heading to Colorado in the next few weeks.

Have you ever had the experience of walking into a room of complete strangers? Imagine you are attending a welcoming reception at a conference with several thousand people. You have a lot in common with this mass of humanity—computers, science, mathematics, mutual disdain for some vendors, science fiction TV shows about the future, and probably a lot more.

Then why do you feel so awkward, so out-of-place? Doubts are running rampant in your head, Who will I talk to? How should I introduce myself? Should I interrupt someone's conversation? Maybe you just want to grab a cold one and stand against a wall. You stare into the crowd hoping to see a familiar face. Sound familiar??

In the past several years, I have talked to users who seem to be a little tentative about Interex. They're just not sure whether they ought to be involved. Are there any benefits to them personally or to their organization? Why are they there?? How might they contribute?

As a long time-member, (and frequent volunteer) I can say without a doubt that you are welcome. I remember my first Interex conference, and boy was I uneasy. Everyone knew more than I; some had been using HP systems for years. I was just a rookie. But I quickly discovered that it mattered little whether you were a user, programmer, system administrator, analyst, or manager; you were welcome.

Many of you may have read that Interex has entered into an alliance with InterWorks, the HP workstation users

group. InterWorks brings a long history of serving their users with top notch conferences and a software library that is unique in many respects. In discussing our mutual goals with InterWorks, we find we have much in common. We both want to serve our membership in ways that help them use HP systems more effectively. We are overcoming our tentativeness and seeing we have much to share.

You should be encouraged by these developments, especially when it comes to the CSL. The committee is actively working with the Interworks Librarian and other interested parties to deliver an ever-expanding collection of software and information. This "information archive" will be expanding to include World Wide Web access, on-line articles, and interactive support. Along with *hp-ux/usr* and *Interact* magazines and our great conferences, Interworks and Interex are ready for the future of HP computing.

I'm hopeful that through the efforts of the volunteer leadership, staff, and other members we can continue to convince you that Interex should be an essential part of your profession.

What's New

Interex is now on the World Wide Web! The Web is a very large collection of information archives all over the world. You access the Web through what's called a browser. There are Motif, Windows, MacOS, and terminal-based browsers available from many Internet sites. On the 3419 release of the Interex CSL you will find Mosaic, a Motif browser. We will have some of the other browsers on the Denver Swap Tape.

Interex has put up the server and a "Home Page," which is your window into the Interex archives. As the year progresses, we hope to expand the content



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of the server and offer some exciting alternative forms of access. If you already have access to the Web, the Universal Resource Locator (URL) for Interex is <http://interex.org/>.

Now that this year's release is out, it might be a good time to explain how software is put in the library. Not so much the mechanics of building a release but how contributors decide what might be a good candidate for the library. It seems to boil down to a simple statement: If I find a program useful in my job, someone else will too. We are solving our problems and sharing what we know and making use of other's solutions at the same time. Sometimes we give assistance, sometimes we receive it. At times it seems like a mutual aid society. But that is what users groups have always been about: realizing that we share common goals and beliefs and then acting on them.

Many of the contributions on this year's release are a sharing of knowledge. *R_CLIENT* is a client-server application, submitted by Steve Gauss of the U.S. Naval Observatory, that provides communications between HP-UX and RTE systems. Steve wrote it to solve a particular problem in his environment but soon realized that sharing his work would provide an educational tool to help others build similar applications. Isaac Blake of the City of Tempe, Arizona contributed a set of socket examples that demonstrate communication between MPE/iX and HP-UX or RTE. Both Steve and Isaac are unselfishly sharing what they know so that we all can increase our skills further.

I urge you to look through the on-line index some day, and see if someone else's knowledge and experiences might help you. Who knows, you might

someday be able to teach us a thing or two! And don't forget to stop by the CSL booth in Denver, I'm looking forward to saying hello to you. ■

Paul Gerwitz is chairman of the CSL/HP-UX committee and is a technology specialist at Eastman Kodak Company in Rochester NY. He can be reached at 716-477-3067 or by e-mail at gerwitz@interex.org or gerwitz@kodak.com

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Product Focus

Quorum Equal 1.3

vi is considered a flexible, powerful—some might say ideal—tool for writing programs and e-mail messages. But how is it for knocking off the occasional memo? Perhaps only slightly better than accommodating a PC *and* a workstation or employing user-friendly applications through a dreadfully slow PC or Macintosh emulator.

These may have been the only options at one time, but emulation products have come a long way. Consider Quorum Software Systems, Inc.'s Equal,

a second-generation Macintosh application emulation product, which, because of its faster-than-traditional performance and native Motif look and feel, the company prefers to call an application adapter.

According to Jay Friedland, Quorum's vice president of sales and marketing, the Equal Applications Adapter is designed to make a Macintosh application appear as if Microsoft actually compiled it on

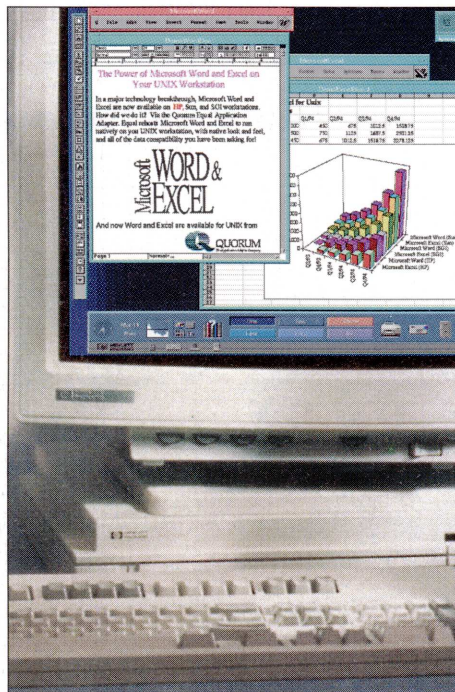
want that, "Most of the customers we cater to are really adept at UNIX, and so we want it to (appear) native."

Equal gives Word and Excel the appearance and functionality of a native port because it displays the applications in a native Motif or Open Look interface with full use of the UNIX file system, X11, or with PostScript fonts and a variety of other native resources. The product achieves this by translating an application's high-level application program interface calls from the application into corresponding calls that UNIX can understand. This approach improves application performance beyond that of earlier emulation technologies.

With previous emulation technologies, "you emulate all the base hardware, and on top of that you run the actual operating system—Windows or System 7," explained Don Chouinard, HP PC accommodations manager. If Quorum had employed a more primitive emulation, it would have to interpret the Motorola hardware instructions one instruction at a time onto PA-RISC, he added. This method requires a lot of time and provides poor performance. It is also why "emulation has traditionally been associated with low performance," Chouinard explained.

Now all emulators are moving toward second-generation technology, which means that "instead of interpreting onto PA-RISC on-the-fly, they precompile the operating system onto PA-RISC," Chouinard said. The second-generation technology—the application adapter—allows the vendor to change the applications' look and feel to either Motif or Mac. "They could just as easily render them in Mac (look and feel)," Chouinard said of Quorum's emulator.

Other emulation products provide a



Quorum Software System's Equal gives Macintosh applications a native Motif Look and feel.

the UNIX workstation and adapted it to accommodate the Motif look and feel. "It's not a little Windows window on the screen," said Friedland of the resulting applications. While he acknowledges that some people might

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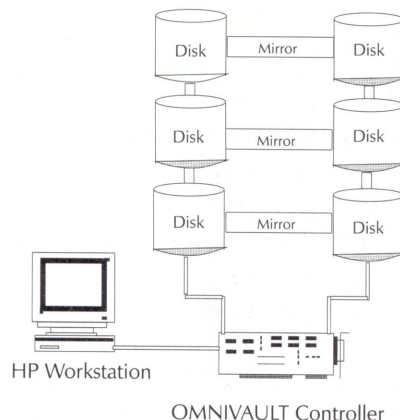
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Macintosh or PC look and feel, and some support a wider range of applications. However, "If somebody only needs Excel and Word, and they want those applications to look on the workstation as similar to other applications on Motif, then Quorum is the fit for them," Chouinard said.

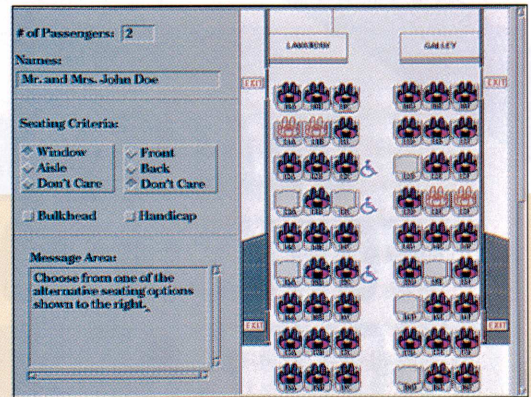
In managing the program to bring emulators to the HP workstation, Chouinard has observed that none of the emulators directly compete, because "All are a little bit different in flavor." He emphasized that HP tries to "have a level playing field. We work with all the vendors so that we can make their product the best it can be on our platform."

On the Model 715, Equal performs in the range of a high-end 386, low-end 486, or low-end Apple Quadra, Friedland estimated. Chouinard did not have exact performance numbers, but based on his own informal test run, he said the adapted applications "seem snappy and responsive." Application performance scales with workstation performance.

The Equal package supports color X terminals, monochrome monitor workstations, and color PostScript output. It also features a built-in file copying facility and a new floating license manager for unbundling and selecting individual applications running under Quorum Equal.

Users can transfer existing Windows or Macintosh licenses of Word or Excel and can order a special UNIX upgrade for \$399 each, or both for \$695. New licenses of Word or Excel with Equal cost \$599 or \$699, respectively, or \$1,295 for the bundled package. Quorum also offers a 12-month maintenance and support contract for \$169 per application.

Quorum and HP are offering a trial CD-ROM version of Microsoft Word and Excel, bundled with Equal, through the HP sales force. The product also is available through UniDirect, which now handles orders and general inquiries about the product. UniDirect can be reached at (714) 453-2999, or (800) 755-UNIX; fax: (714) 707-3095. Quorum can be contacted by writing to 320 Soquel Way, Sunnyvale, California 94086. ■



Correction Notice

The Product Focus in the May, 1994 *hp-ux/usr* featuring Century Computing's TAE Plus Version 5.3 GUI development tool incorrectly references a screen shot as TAE Plus. The actual TAE Plus screen is shown above; Century Computing provided the two screens shown in the May, 1994 article—one a typical character-mode screen and one a typical Motif GUI screen—to show how they contrast with the graphically superior TAE Plus screen.

Century Computing's TAE Plus Version 5.3 is designed to supply both development tools for creating GUIs and management tools for controlling the application's user interface at runtime. The product does not require X or Motif programming. Rather, designers construct an interface out of building blocks called "presentation types." These elements correspond to Motif widgets, such as check boxes, radio buttons, sliders, icons, etc. Developers can select, resize, and position the presentation types on their display, and the corresponding code is automatically generated in C, C++, or Ada.

TAE Plus also provides graphic representations of real-time data through Dynamic Data Objects (DDOs). These dials, gauges, pictures, maps, switches, icons, and animated elements can be manipulated to enter data or control the application.

A basic site license provides unlimited use of TAE Plus on one platform type at one site, the TAE Plus software for the designated platform, and one complete set of documentation. The basic site license is \$1,995; the site license with two months of technical support is \$2,495, and the site license with support for the first year costs \$3,495. No runtime fees are charged for programs developed with TAE Plus.

Michelle Pollace is the New Products editor for *hp-ux/usr*.

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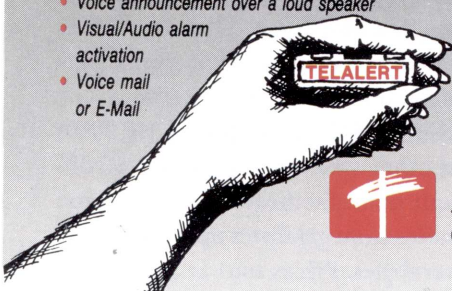
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TelAlert... keeps you in touch



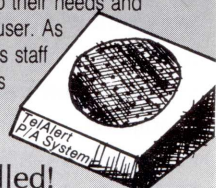
TelAlert is an alarm and notification solution for Unix™ systems and multivendor networks. TelAlert provides timely notification of events to network and system operations personnel and guarantees a quick response to important events. TelAlert ensures that designated staff take ownership of critical problems and it reports key events and actions to other concerned supervisors and management if desired. Alarm and notification options include:

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- Visual/Audio alarm activation
- Voice mail or E-Mail



TelAlert consists of a hardware device connected at a terminal port and software running on the Unix management system or workstation. TelAlert is designed to be integrated with HP OpenView™, SunNet Manager™, Remedy Action Request System™, Network Paradigm™ and other system and network management environments via their command line interfaces in the device or event configuration menus.

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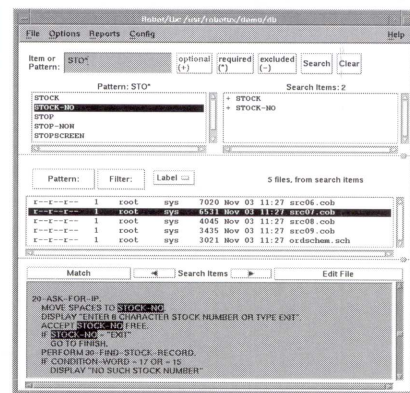
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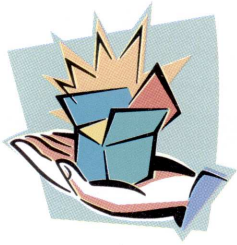
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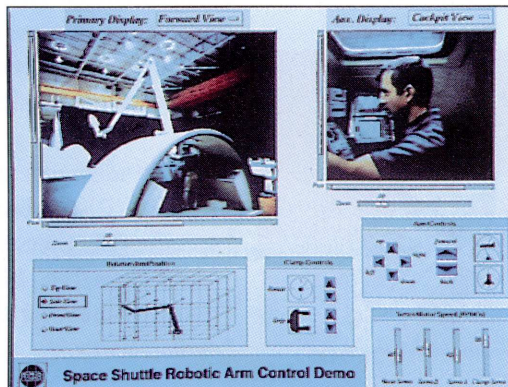
New Products

Video Windowing

RGB Spectrum has announced new input capabilities to its video windowing products for workstations. In addition to composite video and infrared signals, the RGB/View and SuperView products now accept a range of RGB inputs, including RS170 and CCIR rate video signals, and VGA inputs up to 800 x 600 pixels.

With the RGB/View and SuperView products providing the capability to handle up to four inputs simultaneously, it is now possible to create a composite image consisting of a 1,280 x 1,024 pixel computer image generated by an HP, Sun, SGI or other workstation, within

which are inserted VGA images from a PC and/or video images from cameras and infrared devices, all in real time. Each window can be positioned, scaled to full screen, overlaid with computer graphics, or overlapped



RGB Spectrum's Video Windowing

with other video windows.

The new capabilities are available on the RGB/View 600, a VMEbus card, and the SuperView 50, an external stand-alone peripheral device compatible with any workstation. Applications for the products include video teleconferencing, surveillance, command-and-control, and simulation.

Contact RGB Spectrum, 950 Marina Village Parkway, Alameda, California 94501, phone: (510) 814-7000, fax: (510) 814-7026.

Memory Expansion

Cal-Logic has announced the CL-332 memory expansion board for all HP 9000 Model 332 computer systems. Each CL-332 memory board contains 4 MB of memory. Up to two boards can be installed in a Model 332 CPU, providing a total system memory capacity of 8 MB.

Each CL-332 memory board is tested for a 72-hour period prior to shipment, and each board is covered by a lifetime warranty. A 30-day free trial program is available, and single unit pricing is \$350.

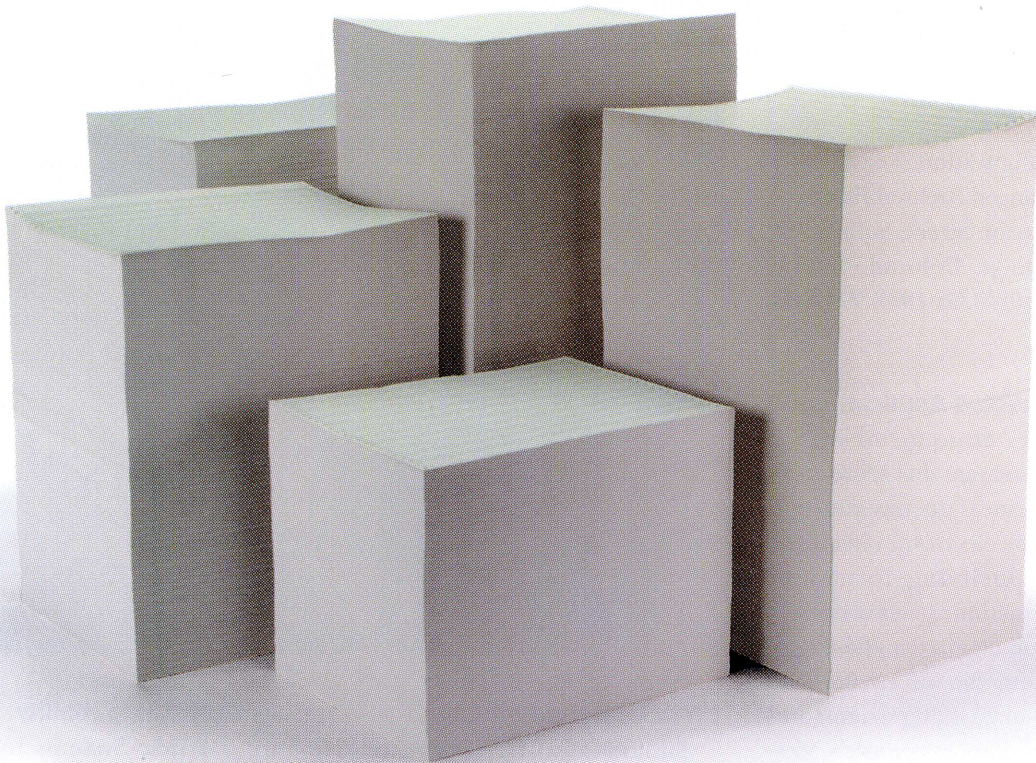
Contact Cal-Logic, 18707 Parthenia Street, #3, Northridge, California 91324, phone: (818) 701-9005, fax: (818) 701-5572.

Storage Management

Advanced Archival Products (AAP) has introduced AMASS Storage Management Systems (AMASS-SMS) software for intensive computing environments. AMASS-SMS provides network storage management functionality including network-direct access to storage libraries, file migration, backup, and Motif-based GUI.

AMASS software provides high-performance direct access to optical and/or tape libraries. It is transparent to applications and network protocols. Data-Manager (DataMgr) software uses client-server architecture to provide transparent file migration and retrieval. Backup services are automatically provided for the AMASS library file system, and system administration tasks are performed through a Motif-based GUI. It provides menu-driven control of library management and file migration criteria.

AMASS-SMS is available for HP 9000s and other systems. It supports 17 different manufacturers of optical tape libraries from gigabytes up to hundreds of terabytes. Prices start at \$6,500 and



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depend on configuration.

Contact Advanced Archival Products, Inc., 6595 S. Dayton Street, Suite 1200, Greenwood Village, Colorado 80111, phone: (303) 792-9700, fax: (303) 792-2465.

Messaging-Enabled Applications

ISOCOR has announced MAPIWARE, desktop software that allows users to exchange business documents such as electronic mail; electronic data interchange (EDI), including forms and workflow information; structured text and graphics; and digitized audio, video, and other multimedia information via a wide range of networking systems and protocols. Based on Microsoft's Messaging Application Programming Interface (MAPI), the new products can be applied to interconnect desktop PC-compatible and UNIX-based computers with enterprise-wide messaging systems and public networks worldwide, without gateways or protocol converters.

MAPIWARE supports the X.400 message handling system and X.500 Directory Services, plus direct Internet e-mail access via the Simple Mail Transfer protocol (SMTP) and encoding of binary files in the Multipurpose Internet Mail Extensions (MIME) format.

Connectivity modules link messaging service providers on the desktop with servers over a variety of standard links using TCP/IP or OSI protocols over LAN or WAN, ISDN, dialup async modems, X.25 or wireless media.

End-user pricing for MAPIWARE components range from \$50 to \$500 per user, depending upon options and volume ordered.

Contact ISOCOR, 12011 San Vicente Blvd., Los Angeles, California 90049, phone: (310) 476-2671, fax: (310) 472-1055.

Electronic Forms

Xpoint has announced ReForm 1.27, electronic forms and barcoding software with additional fax software support, distributed printing, and increased security.

The product supports VSI*FAX, TruFAX, Digifax, ArnetFax, Computone FAX, FAX-FX, Replix, and Faxium. All major UNIX platforms also are supported, the company notes. In addition, ReForm 1.27 supports most application and database management software systems on the market.

The product also allows for distributed printing. In conjunction with data mapping, distributed printing allows users to print a form or forms set to different printers within the company.

Security has been improved in ReForm 1.27 as well. A new program reads data in specified files and either decodes them for editing or encodes them for use with the ReForm Runtime System.

Contact Xpoint Corporation, 3100 Medlock Bridge Road, Suite 370, Norcross, Georgia 30071, phone: (404) 446-2764, fax: (404) 446-6129.

UNIX NetWare Printing

MiniSoft, Inc. has announced NP/UX, a set of NetWare Loadable Modules (NLMs) that allow network printing between UNIX systems and Novell servers. NP/UX acts as a software gateway, allowing files from UNIX print queues to output to printers attached to a Novell server. This gateway is bi-directional; print files from the Novell server can be spooled to a printer attached to the UNIX system. No other software or hardware is required to make the gateway work, the company notes.

NP/UX loads onto the Novell server, where it communicates directly with the UNIX system(s) via TCP/IP and the LPD protocol. When executing NP/UX, users may specify options that govern a number of features, such as page banner, notification of error messages, priority, and number of copies.

NP/UX requires NetWare 3.11 or later, as well as Novell's TCPIP.NLM and Version 3.11d or later of CLIB.NLM. Prices for NP/UX start at \$495 per server.

Contact MiniSoft, Inc., 312 Maple Avenue, Snohomish, Washington 98290, phone: (800) 682-0200.

3480 Compatibility

Tripac Systems Incorporated has announced a three-way distribution and service agreement in conjunction with Hewlett-Packard and Storage Technology Corporation (StorageTek). The agreement enhances HP's service of HP platforms supporting tape storage systems and allows third-party service while preserving HP's seven-days-a-week, 24-hours-a-day maintenance contracts, Tripac notes.

The agreement was facilitated by StorageTek's recent announcement that it had named HP an authorized, non-exclusive service provider for the StorageTek line of tape storage products. Additionally, HP and StorageTek have formed an alliance to bring 3480 tape storage compatibility to HP computing platforms. That agreement enables Tripac, a distributor of both HP and StorageTek products, to provide onsite service and support of the tape storage systems for its users, while HP continues to provide onsite, in- and out-of-warranty service and support on an international basis.

Contact Tripac Systems Incorporated, 5215 North O'Connor, Suite 200,

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HP-UX[®] server and workstation users can now join SIGUNIX, the Interex Special Interest Group (SIG) for UNIX users via e-mail.

To **subscribe**, send a message to {listman@interex.org}. The message should state "sub sigunix firstname lastname."

Once on the list, you'll be included on SIGUNIX communications and you'll be able to send messages to other SIGUNIX members using the {sigunix@interex.org} address.

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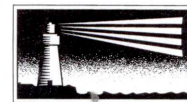


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Data and Application Integration

Information Handling Services (IHS) has announced Congruity, a database platform designed to offer integrated information management and retrieval in a multiplatform, networked environment.

The product includes a GUI layer design with a GUI-independent development tool, a fully integrated API for programmatic access to all application functionality (*not* just a convenient subset), and a database interface layer. Congruity supports critical external data including IHS collections of U.S. industry, non-U.S. national, and international standards, military specifications, electronic component data, and more than 60,000 vendor catalogues.

A basic 20-user subscription is priced at less than \$50,000 and includes the information server/search engine, the client application, the system administration modules, initial site analysis and installation (information server only), systems administrator and end-user training, software maintenance, and technical support. Full product availability is expected in first quarter 1995.

Contact Information Handling Services, P.O. Box 1154, Englewood, Colorado 80150-1154, phone: (800) 525-7052 or (303) 267-1418, fax: (303) 267-1326.

Open Enterprise Software

System Software Associates Inc. (SSA) has announced Version 5.0 of its BPCS/AS client-server enterprise information system. BPCS/AS (Business Planning and Control System/Advanced Solution) features more than 60 applications that cover all operations including sales, engineering, distribution,

Backup/Restore Utility

Lone Star Software Corporation has announced a major new release of the Lone-Tar backup and restore utility. Lone-Tar comes with an extensive menu interface and works with Cactus DOS-Tar (available from Cactus International Inc.). Lone-Tar is available for more than 30 different versions and releases of UNIX.

Improvements address usability, easy installation, and numerous new features for backup, restore, or crash-recovery situations. New features include unmount/remount file systems on-the-fly; wildcards supported on backups/restores; wildcards that can be used simultaneously; enhanced error logging; improved integration with Tape-Tell; bit-level verification; double buffering to increase speed; restoration enhancements; added flags for additional options; added variables for ease of configurability, flat file restore, non-destructive interactive mode, and backup of RAW partitions and virtual files (including bit-level verification).

Existing Lone-Tar users can upgrade to the new release for \$85. Licensing for the product is on a per CPU basis; however, sites are not charged for using Lone-Tar with additional nodes attached via Network File System (NFS).

Contact Lone Star, Inc., 13987 W. Annapolis Court, Mount Airy, Maryland 21771, phone: (800) 525-UNIX or (301) 829-1622, fax: (301) 829-1623.

logistics, finance, manufacturing, plant maintenance, and quality assurance.

BPCS Version 5.0 incorporates a client-server foundation to support distributed computing on a variety of computer servers; graphical user interface, for easy navigation through BPCS/AS applications; User/Vision, a graphical application that enables users to retrieve information from the enterprise database in the form of custom reports and graphs; simultaneous support of eight languages, to accommodate global operations; and FastPath methodology, to ensure quick and successful implementations.

A core group of BPCS/AS products is available for the HP 9000 with Informix Software's Informix-OnLine relational database. This group includes key functions in Inventory Management, Purchasing, Cost Accounting, Advanced Process Industries, Manufacturing Data Management, and Shop Floor Control.

List prices for BPCS/AS applications range from \$1,875 to \$17,500 and increase depending on the computer

server or number of concurrent users.

Contact System Software Associates, Inc. (SSA), 500 West Madison, Chicago, Illinois 60661, phone: (312) 641-2900, fax: (312) 641-3737.

Testing Software

Performance Software Inc. has announced V-TEST for UNIX/HP-UX, designed to provide an environment for the rapid development of tests using recordings of actual user sessions, a user-focused fourth-generation language, or a combination of both.

Once developed, tests can be executed interactively or as batch processes. The runtime system allows tests to be organized in hierarchies or in sequence, and complete audit facilities are provided for investigation of defects. Tests can be run on "pseudo" terminals, allowing the test to exceed the physical capacity of the system. V-TEST for UNIX/HP-UX has the added advantage of being able to test applications across a network using its Remote Terminal Emulation (RTE) capability.

hp-ux/usr

Workstation Articles

Interex initiated the publication of *hp-ux/usr* to serve the needs of HP-UX users. It is a forum for sharing information on all HP-UX systems—including workstations, business systems, and networks. The award-winning magazine is now in its second year of publication, and it has met with an enthusiastic response from its readership.

Feature articles in *hp-ux/usr* so far have covered topics relevant to both Series 800 and Series 700 users. Some have been series-specific, some of general interest. The columns treat a wide variety of subjects, from systems administration to the X Window System. The Question and Answer department always contains both a general HP-UX and a workstation section.

InterWorks and Interex now have an alliance in which cooperation and sharing are actively promoted. InterWorks has many experienced Series 700 workstation users and they are encouraged to write for *hp-ux/usr*. The magazine is a user-group publication and as such its underlying premise is the sharing of knowledge. InterWorks members who have the expertise, and a desire to help other users make more effective use of their workstations, are welcome in the pages of *hp-ux/usr*. It is an ideal forum in which to share that knowledge.

The magazine accepts articles on all aspects of HP-UX computing. It is *not* intended solely as a business UNIX publication: workstation articles on technical and scientific subjects are welcome. Authors are paid an honorarium of \$65 a typeset page. Writers who review software or hardware receive a bonus that ranges from \$300 to \$800, depending on the complexity and length of the review. *hp-ux/usr* is bimonthly; the due date for copy is nine weeks before the issue date. If you are interested in writing workstation articles, contact *hp-ux/usr* managing editor Michael Ehrhardt to discuss proposed topics and to request a copy of the Author's Guidelines. Send e-mail to ehrhhardt@interex.org or call 408.747.0227.

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Contact Performance Software Inc., 26 Parker Street, Newburyport, Massachusetts 01950, phone: (508) 462-0737, fax: (508) 462-4755.

Fault Management System

Boole & Babbage, Inc. has announced an enhanced release of its COMMAND/POST operations availability and fault-management system for complex multivendor environments. Release 3.1 offers new terminal emulators and application program interfaces (APIs). Now users can implement AutoCOMMAND scripts that can take action as if there were a human operator at a console or logged into an application session.

Release 3.1's COMMAND/Post Connection Bank features documentation, predefined filter libraries, and detailed path descriptions for connectivity to various system and network elements, including units for Cisco routers, Novell NetWare 3.11, Timeplex, IDNX, SunNet Manager 2.0, and NEAX 2400 PBX. The Connection Bank will be updated continually with new connection units as they are submitted, refined, and tested.

COMMAND/Post 3.1 is available now. Software pricing begins at \$60,000 for a basic implementation.

Contact Boole & Babbage, 3131 Zanker Road, San Jose, California 95134, phone: (408) 526-3000, fax: (408) 526-3503.

UNIX Network Backup

The Spectra Logic division of Western Automation has announced a

Job Scheduling

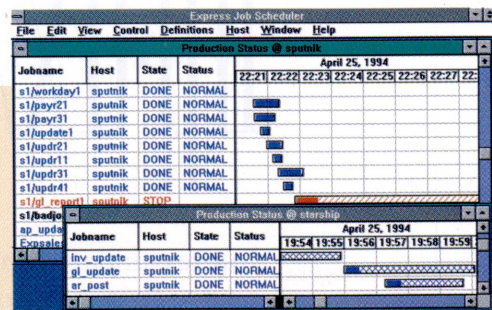
Operations Control Systems (OCS) has announced EXPRESS job scheduling software for UNIX. EXPRESS delivers the high degree of job scheduling visibility with an intuitive, color-coded graphical user interface, enabling operators to easily spot exceptional conditions, such as a job that is running too long or has aborted.

Job scheduling information is displayed in Gantt chart format. Online, context-sensitive help is available at the touch of a key. The EXPRESS master schedule provides operations with a single point of control for distributed job schedules and queues on every networked UNIX system in the organization, providing automated job scheduling across multiple platforms in complicated networked environments.

EXPRESS currently runs on HP MPE platforms. EXPRESS for UNIX is the result of complete redevelopment. The product also features automated control over production jobs on a 24-hour basis, seamless integration with multiple UNIX platforms, and complete auditing, security, and recovery facilities.

Available immediately, EXPRESS for UNIX pricing starts at \$5,000 and varies, depending on system configuration.

Contact Operations Control Systems, 560 San Antonio Road, Suite 106, Palo Alto, California 94306, phone: (415) 493-4122, fax: (415) 493-3393.



new release of its UNIX network backup software, the Alexandria Backup Librarian. Version 2.50 adds many new features and enhancements to Spectra Logic's flagship software product as well as support for additional tape libraries, storage devices, and hardware platforms.

New to Version 2.50 is Spectra Logic's RPF (Raw Partition Formatter). Alexandria formatters control the transfer of data to media (tape or optical). Different formatters can be chosen for different stores: the *tar* and *cpio* formatters allow Alexandria media elements to be read with the standard UNIX utilities. The Alexandria formatter supports delete-tracking and allows files to span multiple media elements. The new RPF formatter has

been optimized for high-performance transfer of large data sources.

New features include enhanced mail handling, tools to test and optimize network performance, default client installation and configuration, enhanced X-11/Motif interface, and improved recognition and handling of offline devices.

The Alexandria Backup Librarian software now supports ATL Products' ACL5480 and ACL2640 tape libraries. ATL Products' libraries provide modular and expandable storage for the midrange computer market.

Contact Spectra Logic, 1700 North 55th Street, Boulder, Colorado 80301, phone: (303) 449-7759, fax: (303) 939-8844, e-mail: alexandria@spectra.wali.com.

Interex is your HP-UX advocate

ad • vo • cate: to plead in
favor of, *see support*

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SIGUNIX—The Special Interest Group for UNIX, meets at the annual Interex HP Computer Users Conference to discuss areas of concern unique to HP-UX users and to share solutions.

Systems Improvement

Committee/HP-UX—The SIC HP-UX pinpoints specific user needs for the HP-UX operating system and presents its requests for system upgrades, etc. to Hewlett-Packard.

Advocacy Coordinating

Committee—The Advocacy Coordinating Committee facilitates communication between HP-UX users and Hewlett-Packard, enabling users to have specific concerns referred directly to the accountable HP entity. This committee tracks and manages all advocacy requests and publicly discloses the outcome of all advocacy issues.

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Database Design Tool

Six Sigma CASE, Inc. has announced a database design tool that imports and exports directly to Cadre Technologies' Teamwork software development automation tools.

Canonizer for Teamwork is used for new modeling, database conversion and migration, re-engineering, and client-server design. It uses the mathematical process of Canonical Synthesis to create a data model in Third Normal Form, which is required by Entity Relationship Diagramming (ERD) design methodologies.

The Canonizer will convert existing IM/SQL databases, perform automatic normalization, and import directly into Teamwork, or it can be used at the start of a project to prepare a model for ERD work.

The Canonizer supports Oracle, Informix, Sybase, Ingres, Unify, DB2, or any ANSI/SQL-compliant DBMS. It will run on HP-UX and other platforms.

It was to be released in August with a price set at \$4,995 for a single user.

Contact Six Sigma CASE, Inc., 13456 SE 27th Place, Bellevue, Washington 98005-4211, phone: (800) 827-4462.

Optical Jukeboxes

Artecon has announced enhancements and extensions to its optical jukeboxes lowering the cost-per-megabyte of optical storage. At the low end, Artecon has added the HP DSU1-300J3-16H and the IDE "multi" DSU2-300J3-40I to its ArteEOJ library management software.

The DSU1-300J3-16H, based on HP robotics, provides 16 slots of 1.3-GB rewriteable optical storage for over 20 GB of total capacity. Average disk exchange time of 8 seconds and an average access time of 23.5 ms provide fast access to any file on any cartridge in the jukebox. It is priced at \$9,995.

Memory Arrays

KELLY Computer Systems has announced a series of memory arrays for HP 9000 Models 715/64, 715/80, and 715/100.

Like all KELLY memory arrays, these are designed and manufactured in-house using KELLY's three-part Exact Quality Replication process and are backed by KELLY's lifetime hardware warranty and before-return replacement guarantees.

KELLY Computer Systems develops, manufactures, and markets a complete line of memory and performance enhancement software products for the HP 9000 Series 800 servers and Series 700 workstations, as well as the HP 3000 minicomputer family.

Contact KELLY Computer Systems, 139 North Whisman Road, Mountain View, California 94043, phone: (415) 960-1010, fax: (415) 960-3474, e-mail: cathy@kelly.com.

Support for the latest IDE robotics has been extended in the form of the 10-slot, 13-GB DSU1-300J3-10I and the 20-slot, 26-GB DSU1-300J3-20I. Ten-slot jukeboxes can be easily upgraded in the field, the company notes.

In addition, Artecon has extended its midrange optical offering with the DSU2-300J3-40I—a 20-slot, 52-GB subsystem with a list price of \$28,995. It is based on dual Maxoptic Tahiti 3 drives with 19 ms average access time.

All of the new jukeboxes come bundled with ArteEOJ, Artecon's GUI-based optical library management software.

Contact Artecon, Inc., P.O. Box 9000, Carlsbad, California 92018-9000, phone: (619) 931-5500, fax: (619) 931-5527.

Code Analysis

PROCASE Corporation has announced SMARTstructure Chart, SMARTreport Writer, and Version 4.0 of SMARTsystem.

SMARTstructure Chart shows the calling structure of the program and a complete picture of the control mechanisms of the program. The Structure Chart displays information about how functions are called, parameter types,

and control flow. It can distinguish between data that is being modified and data that is only being referenced. All of the information in the Structure Chart about functions, calls, and data can be used to navigate instantly to the precise location in the source code where that data is used.

SMARTreport Writer offers automatic generation of reports on metrics, data dictionary, program build information, CPP macros, and errors.

The new SMARTsystem 4.0 upgrade provides color coding of program information. For instance, it will show expanded CPP macros, errors, or scope-sensitive cross-references in a different color from the source code. Also featured in the new release are bug fixes and substantial performance improvements.

SMARTsystem sells for \$5,000 per user in a multiuser environment and \$2,995 for a single-user version. The SMARTstructure Chart can be purchased for \$3,000 and the SMARTreport Writer for \$1,000.

Contact PROCASE, 2694 Orchard Parkway, San Jose, California 95134, phone: (408) 433-9500, fax: (408) 435-2600.

New from PDC

UNIX Backup

PDC has announced BudTool 4.3, the newest version of the UNIX backup and retrieval product for large, heterogeneous networks. Available on the HP 9000 and other platforms, PDC BudTool 4.3 features many new programs designed to further automate media handling. The product enables users to define policies that specify backup expiration times and procedures. It also includes programs that allow users to track tape statistics such as the age of the tape, its location, the number of times it was used; available space; expiration date; and media errors.

PDC BudTool 4.3 supports 8-mm and DAT tape drives, stackers, and jukeboxes. It uses standard UNIX utilities.

Exabyte 8-mm Tape Library

PDC has announced the EXB-210 8-mm Library. The product is the first of Exabyte's new family of half-high libraries, supporting two half-high drives and up to eleven 8-mm data cartridges.

The EXB-210 features robotic technology which reduces costs, eliminates human errors and downtime, and maximizes resource use while approaching 100-percent data availability.

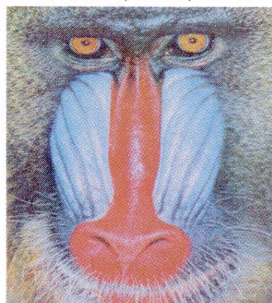
Other advantages of the EXB-210's dual drives include parallel processing, fault tolerance, and improved media handling. The Exabyte unit comes in a vertical stand-alone orientation or a horizontal rack-mount version.

Contact PDC, Continental Plaza, 1002 West Ninth Avenue, King of Prussia, Pennsylvania 19406, phone: (800) 654-4PDC or (610) 265-3300, fax: (610) 265-2165.

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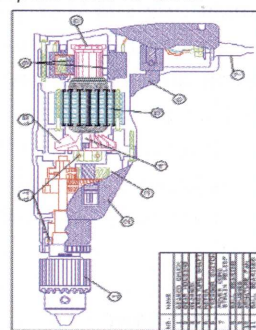
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Database Application Creation

ParcPlace Systems, Inc. has announced VisualWorks 2.0, a major new release of the company's object-oriented client and server tool. VisualWorks 2.0 emphasizes ease of use and features a Database Application Creator designed to allow corporate developers to create basic database applications without any Smalltalk or SQL programming.

Developers can create applications that use and manipulate relational data as objects. VisualWorks 2.0 supports relational databases from both Oracle and Sybase. Additional support is planned for Microsoft's ODBC, as well as DB2, through a gateway. Data models are created so the application is independent of the target database.

A GUI builder, database access capabilities, and the ParcPlace Smalltalk object-oriented programming language are included.

VisualWorks 2.0 is priced at \$2,995 for Windows, Windows NT, Macintosh, and OS/2, and \$4,995 for UNIX-based systems. The VisualWorks Database Connect for Oracle and Sybase is priced at \$495 each. VisualWorks 2.0 is targeted for delivery in the third quarter of 1994 on HP 9000 Series 700s and 800s and on other platforms.

Contact ParcPlace Systems, Inc., 999 E. Arques Avenue, Sunnyvale, California 94086-4593, phone: (408) 481-9090, fax: (408) 481-9095.

Sales Force Automation

Andersen Consulting has announced MAC-PAC OPEN's Sales Force Automation (SFA) module, a portable, Windows-based version of the software's order entry system. The SFA module includes MAC-PAC's patented Expert

Configurator, a knowledge-based tool designed to help make-to-order manufacturers improve order accuracy and customer response time. The SFA module enables sales personnel to enter both standard and custom product orders into MAC-PAC from remote locations such as a customer site.

The SFA module provides the manufacturer's sales force with pricing, engineering, and order rules. This provides sales personnel with accurate order entry and product configuration information on their PCs while they are away from their central information system.

Andersen Consulting's MAC-PAC OPEN software is an integrated manufacturing, distribution, and financial solution for mixed-mode manufacturers.

Contact Andersen Consulting, 69 West Washington Street, Chicago, Illinois 60602, phone: (800) 541-7512 or (312) 507-6588.

VT420 Terminal Emulation

Thursby Software Systems, Inc. (TSS) has announced the release of TSSterm 420, a VT420 terminal emulator for HP 9000 workstations. It provides users with exact DEC VT420 terminal emulation in the X Window environment.

TSSterm 420 emulates DEC VT52, VT100, VT220, VT320, and VT420 terminals. Other capabilities include true 132-column mode, multiple sessions, multiple pages, print capture, and session logging. TSSterm 420 also provides true representation of all character attributes.

Name Searching

Search Software America (SSA) has announced SSA-NAME3, Version 1.6.1, a name-search software product. It is designed to provide users with high-performance name searches of people and company names, despite errors and variations that occur. It is used for databases with 100,000 to 100 million records.

The software allows users to retrieve information associated with a particular name despite errors in spelling, phonetics, and keypunching. It also compensates for problems associated with abbreviations, foreign names, and missing words.

It is priced between \$24,000 and \$66,000 for a perpetual license.

Contact Search Software America, Inc., 1445 East Putnam Avenue, Old Greenwich, Connecticut 06870, phone: (203) 698-2399, fax: (203) 698-2409.

The emulator can be used with various networking products to provide connectivity to different systems. TSSterm 420 also can be used with TCP/IP's "rlogin" connections.

TSSterm 420 for the HP 9000 is available starting at \$495 for a four-session license.

Contact Thursby Software Systems, Inc., 5840 W. Interstate 20, Suite 100, Arlington, Texas 76017, phone: (817) 478-5070, fax: (817) 561-2313.

Talking E-Mail

International Discount Telecommunications (IDT) has developed a system that will make it possible for blind and dyslexic individuals, the elderly, and millions of others to receive e-mail.

Users of this system are given their own e-mail address. When an e-mail message is received, the user's phone rings. The e-mail message has been automatically turned into a voice message, played when the phone is answered. If the user is not at the phone, or chooses not to answer it, the message is instantly saved into a voice mail system for later retrieval.

Contact IDT, phone: (201) 928-1000, fax: (201) 928-1057.

IC Design Support

C.A.E. Plus has announced ArchGen Version 1.0, an IC design support system designed to improve the quality of register-transfer level (RTL) design and design verification vectors and to reduce the time to develop validated, optimized, and synthesis-ready RTL models for data and control paths from months to weeks.

IC developers graphically capture design behavior using 14 predefined icons. The design is then validated through a C performance/function event simulator, a graphical animator, and a timing diagram operating forward and backward in time.

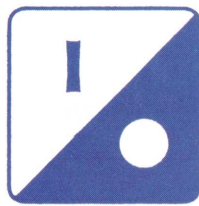
ArchGen is currently available on HP workstations running HP-UX 9.0. The price for a single floating license is \$59,900.

Contact C.A.E. Plus, Inc., 9130 Jollyville Road, #340, Austin, Texas 78759, phone: (512) 338-0165, fax: (512) 338-0192.

DDS-2 DAT Backup

Conner Storage Systems has announced the Conner CS DDS-2-DAT drive (Model CS4000DAT+), an advanced DDS-2 tape backup system that provides up to 4 GB of uncompressed storage and up to 16 GB (8 GB typical) of compressed data storage on a single 4-mm tape. The CS DDS-2 DAT subsystem delivers high-capacity, high-performance backup in popular operating environments, including HP-UX.

Using industry-standard DDS-DC data compression, the subsystem transfers data at 400 KB per second up to 1.6 MB per second over a SCSI-2 connection and can access any file on a 120-meter tape in an average of 40 seconds. It provides an expected Mean Time Between Failures (MTBF) rating of



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ASTA, Inc. QA C++

greater than 200,000 hours.

The Conner CS DDS-2 subsystem is available in a 5.25-inch form factor for internal installation or as an external system with built-in power supply. The system is fully tested for compatibility with major UNIX operating systems and ships with all installation hardware, including media, cables, and SCSI terminators. List prices begin at \$2,000.

Conner provides 48-hour turnaround on product repairs under warranty and a two-year warranty on all CS Series DAT tape backup systems.

Contact Conner Peripherals Storage Systems Group, 36 Skyline Drive, Lake Mary, Florida 32746, phone: (407) 263-3500, fax: (407) 263-3555.

Printer Management

API International has announced Unispool 4.0, which connects NetWare print servers and eliminates the need for a gateway PC.

Unispool 4.0 now uses a NetWare Loadable Module (NLM) to link Novell servers. The software, which operates on HP, Digital, Sun, IBM, and SCO UNIX systems and Novell and LAN Manager servers, permits firms with multiple network LAN clusters to link all their users to printers anywhere in the network—without inserting a PC as a gateway between servers.

Novell specifies particular PCs it certifies as gateways, and performance suffers when point jobs must pass through a gateway system. The Unispool NLM, used in conjunction with Unispool host software, improves print performance by eliminating the need for this

C++ Software Analysis

ASTA, Inc. has announced a new automated software analysis system designed to improve the portability, maintainability, and reliability of C++ source code. QA C++ is used primarily by software development and quality assurance organizations to analyze C++ source code and check for more than 300 different types of potential problems.

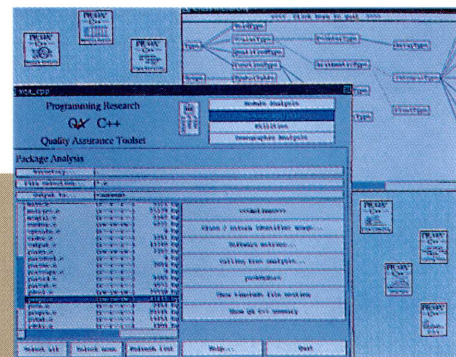
QA C++ also produces a variety of reports that describe and rank potential problems.

QA C++ calculates and reports on more than 40 different metrics, including cyclo-matic complexity (McCabe), static path count, depth of inheritance tree, number of missing method definitions, number of immediate parents/children, weighted methods per class, and coupling between objects.

Users can make comparisons of the quality of their source code from one release to the next and compare the relative quality of their code with samples from industry.

QA C++ can be configured to support the unique requirements of a particular company or department. An X-Window and command-line interface are offered.

ASTA Incorporated, 1 Chestnut Street, Suites 205/206, Nashua, New Hampshire 03060, phone: (603) 889-2230, fax: (603) 881-3740.



gateway. The NLM works with versions 3.11, 3.12, and 4.0 of NetWare.

Contact API International, P.O. Box 91027, Austin, Texas 78709, phone: (512) 280-4391, fax: (512) 280-0309.

Dynamic Object Analysis

Lucid, Inc. has announced that the Energize Programming Environment now supports dynamic object analysis with Look!, a dynamic object browser from OpenObjects. Lucid will offer a bundled version of Look! with Energize for \$5,995 or separately for an additional fee.

Energize allows developers to jump between static and dynamic views of their code quickly and transparently by supporting ToolTalk. Dynamic object analysis allows developers to see actual code in action. Look! extracts object and class design-level information embodied in a C++ program and uses it to generate active object, class, and message-view diagrams.

A Look! and Energize bundle lists for \$5,995; a 10-pack of the two

products costs \$4,525 per seat. Energize alone lists for \$4,250, while Look! lists for \$2,000. Site licenses and educational discounts are available. Lucid will provide full customer support for Look!

Contact Lucid, Inc., 707 Laurel Street, Menlo Park, California 94025, phone: (415) 329-8400, fax: (415) 329-8480.

Centralized Security

Qualix Group, Inc. has introduced UniShield, centralized access security management software for distributed UNIX environments. Published and distributed by Qualix Group, UniShield was developed by Network Information Technology. Support for HP-UX was to be available early fall 1994.

UniShield is designed to combine the advantages of enterprise-wide information access and centralized control. By dividing the workload among several different servers, UniShield's configurable load partitioning scheme allows it to support small and large user environments.

The product monitoring and control

features include access route, access hours enforcement, account expiration and activation, disable access after invalid attempts are made, password aging and qualification, concurrent session and root access control, and others. Security policies can be tailored for the entire organization, as well as for different user groups, remote access users, a particular system, or individual users. The product features a motif-based GUI.

UniShield is priced starting at \$1,000. Volume seating priced packages are available.

Contact Qualix Group, Inc., 1900 S. Norfolk Street, #224, San Mateo, California 94403, phone: (415) 572-0200, fax: (415) 572-1300, e-mail: info@qualix.com.

Print Sharing Utility

RAC Consulting has announced PRINTPATH/NLM For UNIX, a NetWare to UNIX print sharing utility. PRINTPATH/NLM For UNIX runs as a NetWare Loadable Module (NLM) on the NetWare server and implements the UNIX Line Printer Daemon (LPD) remote printing protocol on the server. This allows print files to be exchanged in either direction between NetWare servers and UNIX systems over TCP/IP connections. No software is needed on the UNIX host, since LPD support is built into UNIX systems. The product also can be used with non-UNIX hosts or network printing devices that support LPD.

The product is priced at \$895 for the first server and \$495 for each additional server. Free demonstration copies are available.

Contact RAC Consulting, P.O. Box 10099, Olympia, Washington, phone: (206) 357-9572, fax: (206) 352-8453.

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HP 2392A, 2622A, 700/92	

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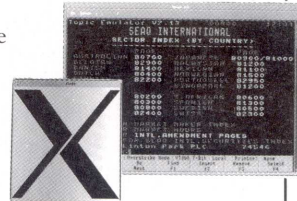
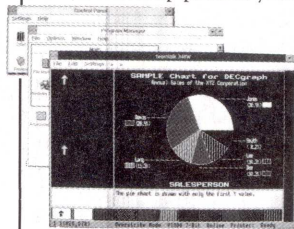
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CIRCLE 95 ON READER SERVICE CARD

Electronic Commerce

Sterling Software has announced **COMMERCE:Interactive**, a complementary product to Sterling Software's **COMMERCE:Network Quick Response** is a retail business solution that involves ordering and replenishing inventory quickly and efficiently using Electronic Commerce technologies, including Electronic Data Interchange (EDI), barcoding, and point-of-sale data capture. **Electronic Commerce (EC)** is the electronic flow of business information between organizations, and EDI is the cornerstone of EC.

COMMERCE:Interactive is designed to provide an immediate electronic response, or interactive EDI, using familiar, reliable tools, but without a significant investment. Data sent along the **COMMERCE:Interactive** path moves at an accelerated pace, reducing normal transmission time by bypassing traditional store-and-forward mechanisms and transmitting information directly through the network.

Combined with **GENTRAN:Realtime**, Sterling's interactive EDI management software, it provides the most advanced interactive EDI solution available for the mainframe retail environment, the company notes.

COMMERCE:Interactive for CICS-based **GENTRAN:Realtime** will be available in June. Subsequent releases later this summer will add interactive EDI support for UNIX-based **GENTRAN:Realtime** as well as third-party

CICS and UNIX-based EDI translation software products.

Contact Sterling Software, 4600 Lakehurst Court, P.O. Box 7160, Dublin, Ohio 43017-0760, phone: (614) 793-7000.

Cross-Platform Development

Visix Software Inc. has announced the creation of a program designed exclusively for the higher education market. The **Galaxy University Program (Galaxy U)** offers qualified teaching and research facilities a complete **Galaxy Application Environment** package at a significant discount. **Galaxy** is a cross-platform development environment designed for creating large-scale, mission-critical applications that are graphical and distributed. Through **Galaxy U**, qualified teaching faculty and researchers gain access to the full commercial C or C++ version of **Galaxy**, complete documentation, training, and maintenance and

support. The discount for qualified teaching faculty is over 95 percent.

Galaxy U offers three tracks for participation: teaching, research, and commercial use. Each offers an attractive set of terms geared specifically for that track. **Galaxy U** offers the same application development tools found on Wall Street and other demanding commercial environments but is priced to accommodate academic and research budgets. Early program participants include Carnegie Mellon University and University of Maryland.

With **Galaxy**, applications are built only once, and compiled to run enterprise-wide on a broad range of desktop and server platforms, networks, and window systems—all without changing a single line of code, the company notes. Supported platforms include UNIX, Windows, Windows NT, Macintosh, OS/2, and OpenVMS.

Proxima Ovation 920



LCD Projection Panel

Proxima Corporation has announced the **Proxima Ovation 920**, said to be the first fully workstation-compatible, active-matrix LCD projection panel capable of displaying 1,280 x 1,024 images. The product's fit-to-view allows it to display the highest resolution images of any active-matrix LCD project panel, the company notes.

The panel's zoom mode allows a 640 x 480 image to be blown up to fill the entire screen. With a data rate of 135 MHz, **Ovation 920** is said to offer the highest bandwidth compatibility of any LCD projection panel. It can interface with the highest-speed workstations directly at their highest resolution mode.

The **LightBoard** lets users add information directly to the projected image, regardless of application. The **Cyclops** interactive pointer system is designed to give users complete remote control of both their computer and software.

Capable of projecting more than 2 million true colors (from a palette of 16.7 million), the panel features a 10.4-inch LCD pane, Proxima's proprietary **Active Color Enhancement** technology, and 24-bit video processing.

It is compatible with all popular workstation and PC platforms, including HP 9000 Series 700s. A digital video controller projects all three international video standards, as well as S-VHS.

The **Ovation 920** is priced at \$14,595.

Contact Proxima Corporation, 9440 Carroll Park Drive, San Diego, California 92121-2298, phone: (619) 457-5500, fax: (619) 457-9647.

Contact Visix Software Inc., 11440 Commerce Park Drive, Reston, Virginia 22091, phone: (703) 758-8230 or (800) 832-8668, fax: (703) 758-0233.

Motif Workspace Manager

IXI Corporation has announced IXI Panorama for HP-UX and other UNIX platforms. Panorama is designed to provide an unlimited "virtual" workspace, enabling users to spread windows and icons limitlessly beyond their screens and then access them with a simple point and click or smooth pan across the entire workspace.

IXI Panorama is designed to enable users to personalize their workspace in seconds with a graphical configuration tool. Screens may be split up into various work areas such as mail, spreadsheets, database, and desktop publishing. A "sticky window" facility enables specific critical data windows to be glued to the screen and to move everywhere with the user.

IXI Panorama is an extension of the standard OSF/Motif Window Manager and is 100 percent compatible with it. The basic OSF window manager can be switched on dynamically while running IXI Panorama if needed. IXI Panorama is completely compatible with the future COSE CDE, which has limited workspace management. Users requiring unlimited, continuous workspace will be able to run the IXI Panorama window manager within the CDE environment.

Contact IXI Corporation, 400 Encinal Street, P.O. Box 1900, Santa Cruz, California 95061-1900, phone: (408) 427-7700, fax: (408) 427-5407.

Networking Tools

American Hytech Corporation (AHC) has announced NetGuru, a series

LAN-HO!

Total HP Connectivity One Product, One Price

Before you embark on a journey into the maze of LAN connections, look to MiniSoft's terminal emulation software for complete PC-to-host connectivity.

Covering all industry-standard local area networks, MiniSoft 92 combines all the connectivity software into a single package. It provides you with the simplest, most direct route available, creating a friendly landscape of LAN connections.

So why pay extra for LAN connectivity when you can get the same LAN support in ONE package with HP and DEC terminal emulation. MiniSoft 92 provides connections for Telnet, Network Services, TCP/IP, Novell, Lan Manager, Banyan, Lantastic, Windows for Workgroups and many more. It also provides all the terminal emulation features upon which thousands of MiniSoft customers have come to rely.

Whether you are making serial or LAN connections in Windows, DOS or Macintosh environments, MiniSoft 92 will get you where you need to be at \$159.

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CIRCLE 98 ON READER SERVICE CARD

X Terminals

Human Designed Systems has announced X Window terminals with support for Microsoft Windows and Macintosh applications, full multimedia with audio, video, and PostScript display.

The new terminals employ an Intel i960CA RISC processor. Enhanced X Server software is designed for running applications locally in X terminals to offload existing computers. The ViewStation Ultra can run office automation applications like Framemaker up to ten times faster than other manufacturers' X Window terminals, the company notes. Measured by standard X benchmarks, the ViewStation Ultra offers performance of 152,000 XStones.

An optional floppy disk drive and SoftWindows from Insignia Solutions enable access to existing DOS and Microsoft Windows applications.

Full copies of the OSF/Motif and OPEN LOOK window managers, emulation of DEC VT320 and IBM 3270 terminals, clocks, calculators, a screen saver with local lock, and a PostScript display application are included. ViewStation users also can port their own applications to run inside the X terminal with the optional HDSware Developer's Kit. All models run the same version of HDSware.

Pricing for ViewStation Ultra models ranges from \$1,699 to 3,599. Contact HDS, 421 Feheley Drive, King of Prussia, Pennsylvania 19406, phone: (610) 277-8300, fax: (610) 275-5739, e-mail: info@hds.com.



of learning, planning, and operational tools to assist overworked and understaffed network professionals. AHC was advised by a large group of network administrators, network managers, and network integrators throughout the product development process for the NetGuru Simulator Module, NetGuru Manager, and NetBook.

NetGuru Manager allows the network professional to quickly design, illustrate, and document local area networks. Networking palettes supported include Ethernet, Token Ring, Arcnet, and Inter-Networking to connect multiple networks. The user can include all the functional

components in a network, including network interface cards, converters, terminators, transceivers, MAUs, bridges, repeaters, routers, hubs, and different cable types. It also contains an embedded information database that provides not only the functionality of network inventory management, but a visual graphical interface to the network layout.

NetGuru Simulator is a fully functional network simulation module for the simulation of any valid design generated by NetGuru Manager. During and after a simulation, the user can graphically depict and list the ongoing and final results of the simulation.

NetBook is an online reference that allows users to learn about all aspects of computer networks at their own pace. It is designed to provide a comprehensive background on networks as they are solving day-to-day network problems.

The products are available now and run on a PC with Windows 3.x. The NetGuru Manager is priced at \$495, the NetGuru Simulator is priced at \$995, and the NetBook costs \$99. Bundled application options are available.

Contact American Hytech Corporation, 565 William Pitt Way, Pittsburgh, Pennsylvania 15238, phone: (412) 826-3333, fax: (412) 826-3335, telex: 272457.

New From Liant Software

Object-Oriented Development

Liant Software Corporation has announced an OSF/Motif upgrade to C++/Views, an object-oriented applications framework for developing multi-platform, native applications using C++. The new version includes a library of more than 100 C++ classes that support a broad range of GUI software development requirements and several higher-level interface classes such as table, toolbar, and multiple document interface (MDI).

Developers need to create only one resource file for porting to any number of platforms. Resources loaded from the file adhere to the native look and feel of the platform on which they are displayed, the company notes.

C++/Views Release 3 for Windows,

OSF/Motif, and OS/2 is available now from Liant Software Corporation. Special introductory pricing is available starting at \$749 for Windows, \$999 for OS/2, and at \$1,999 for OSF Motif. Quantity discounts, site licenses, and upgrades from previous versions also are available.

Legacy Data Access

Liant also announced Relativity for RM/COBOL, which provides direct access to legacy data without gateways, data warehousing, or replication. Microsoft's ODBC standard enables developers and end users to use a variety of client-based products for the Window environments to access existing COBOL data seamlessly, transparently, and directly. Developers can integrate COBOL-based applications with non-COBOL tools and databases through ODBC. Relativity's use of SQL access provides ad hoc information retrieval and the ability to relationally join COBOL data with other disparate data, both COBOL and non-COBOL.

Relativity supports all existing COBOL data structures. The Relativity repository maintains a true relational representation of COBOL applications data to support programmer and end-user access to COBOL data structures. Relativity is created and maintained by a Windows-based database designer, which manipulates data files exactly the same way as COBOL and supports every data type and nuance of the COBOL language, the company notes. The database manager will provide both read and write access capabilities.

A complete Relativity software development kit for RM/COBOL is available for \$4,995. The Relativity database manager for RM/COBOL starts at \$495 for

single-user access. Significant discounts are available for Liant partners and volume purchases.

Contact Liant Software Corporation, 959 Concord Street, Framingham, Massachusetts 01701-4613, phone: (508) 872-8700, fax: (508) 626-2221.

New from Carolian Systems

Special Projects Division

Carolian Systems Corporation has established its Special Projects Division to service those users developing mission-critical IS infrastructure projects. Carolian notes that it possesses long-established expertise in working with clients to develop client-server solutions and systems utilities for data integrity, database shadowing, network spooling, distributed operations, job scheduling, and performance. The company has designed its division to be well skilled and versatile.

Before the project begins, customers work with their assigned Special Projects team to prepare a list of specifications, and Carolian develops, tests, and delivers a finished product. Upon delivery, Carolian will fully implement it—performing a full installation and configuration and providing a comprehensive technical support program. The product will be up and running and performing fully automated tasks for the customer, the company notes.

Operations by Exception

Carolian also announced two new Operations by Exception products for MPE/iX, HP-UX, and Novell systems—*SmartAlert* and *SmartStation*. Both products monitor systems 24 hours a day and then notify users when a problem or important event occurs. *SmartAlert* and *SmartStation*

work with Windows to provide users with an icon-based interface designed to make them very easy to configure.

SmartAlert provides "lights out" operations, automatically notifying users through voice and pager technology when a critical event occurs. Console Anywhere allows for remote console access and full console control, including systems reboot, from any local or remote terminal or PC. *SmartAlert* also is compatible with HP's OperationsCenter and can be integrated fully with it, Carolian notes.

It also can be integrated fully with Carolian's *SmartStation*, which provides consolidated control and problem management for all distributed systems, including open and proprietary minis, workstations, and PC servers. All important system events, including those that occur at remote sites, are detected and displayed on a network-wide graphical status map.

The products are designed to enable easy setup, offering pre-configured libraries and templates. *SmartAlert* and *SmartStation* are available separately and as a package and are scheduled to ship in early 1995. They will be demonstrated at Booth 325 at the Interex '94 Conference & Expo in Denver, Colorado, September 18-22.

Contact Carolian Systems Corporation, 3397 American Drive, #5, Mississauga, Ontario, Canada L4V 1T8, phone: (905) 673-0400 or (800) 263-8787, fax: (905) 673-7030, FAXback: (800) CAROLIAN.

New From HP

New OpenView PSP

HP and Unison-Tymlabs have announced that Unison-Tymlabs has

joined HP's OpenView Solution Partners Program as a Premier Solution Partner. Under the terms of the relationship, HP and Unison-Tymlabs will participate in joint sales, marketing, support, and future technology implementation plans to provide a single, integrated network and system management solution.

The Premier Solution Partner designation is based largely on the high degree of integration between the Unison Maestro for UNIX distributed workload-management product and the HP OpenView network and system management platform. Unison Maestro is the only commercial-strength job scheduler for UNIX systems that is tightly integrated with HP OpenView.

DCE Development

HP has announced HP Object-Oriented DCE/9000 (OODCE/9000), an application-development toolset said to cut DCE development time in half. HP OODCE/9000 removes a major barrier to the widespread adoption of DCE by making it easier for C++ programmers to use DCE technology. HP OODCE/9000 joins the HP DCE/9000 product family.

HP OODCE/9000 encapsulates DCE API commands into C++ classes with default DCE behavior. (A class is a template that can be used to create individual objects. Objects are reusable modules of code and data.) Developers can use these classes to access DCE services at a higher level, without having to learn all the details of the DCE API. Applications written using HP OODCE/9000 require less source code (by about a factor of three) than comparable HP DCE/9000 applications written in C, HP notes.

HP OODCE/9000 was expected to be available in August 1994. The product will work across the HP 9000 family. The product is \$2,995 for the first developer (includes software and manuals) and \$995 for each subsequent developer. HP OODCE/9000 requires HP DCE/9000 and HP C++ Compiler.

OperationsCenter Version 1.1

HP has announced improved application integration in HP OpenView Operations Center. OperationsCenter is a distributed client-server solution that operates from a central management station and interacts with intelligent software agents installed on managed systems. These agents gather information, messages, and monitoring values originating from sources such as system or application log files, SNMP traps, or any custom monitoring application.

Version 1.1 includes improved enterprise message management that allows Operations Center to receive and display alerts and messages from throughout the computing environment—even from nodes where an OperationsCenter agent is not running. It also now supports the display of submaps from other applications.

New versions of HP's backup-, storage-, and print-management products—HP OpenView OmniStorage, and HP OpenView OpenSpool—will ship fully integrated “out-of-the-box” with OperationsCenter.

Operations Center runs on top of the HP OpenView SNMP Platform Version 3.3.

Contact HP at (800) 637-7740.

PC LAN Software Distribution

HP has announced that HP OpenView Software Distributor now

supports PC-based environments. The improved support simplifies software management in heterogeneous networks where a variety of operating systems and hardware platforms are used.

Software Distributor now supports MS-DOS, MS-Windows, Novell NetWare, HP LAN Manager, and Microsoft LAN Manager. It is a comprehensive set of tools that performs packaging, distribution, configuration, and removal of software products across a company's distributed network.

Network managers can perform software analysis, installations, updates, inventory control, and verification for both PC-client-and server-based environments from a single UNIX-based OpenView console. Software Distributor can distribute a range of software, including operating systems; applications, such as e-mail, word processors, and spreadsheet software; and data files used by applications.

In addition, Software Distributor now provides data compression at network depot servers before software is distributed to workgroup servers or users' desktops.

HP OpenView Software Distributor with support for PC environments is expected to be available in November; prices start at \$2,500. ■

Attention vendors: New product announcements should be sent to New Products Editor, hp-ux/usr Magazine, Interex, P.O. Box 3439, Sunnyvale, California 94088-3439, USA.

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